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Recreational Use of the Quetico-Superior Area

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FOREWORD

In 1960 the Lake States Forest Experiment Station initiated a program of forest recreation research. Currently three full-time Station staff members are doing research in this field.

The initial study dealt with use patterns and with user interests and characteristics in the Boundary Waters Canoe Area, which has been the subject of numerous basic questions concerning recreation policy. This publication by Dr. Lucas is the first major report of our forest recreation research program. Subsequent publications will deal with other phases of this study and will also report on recreation research by other staff members.

Your comments and suggestions concerning the utility of these studies will be helpful in guiding future research.

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Robert C. Lucas

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The Station is maintained in cooperation with the University of Minnesota.

Four abstract cards are included at the back of this report
for the reader's convenience.

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THE PARADOX OF WILDERNESS RECREATIONAL CAPACITY

The Quetico-Superior area is the most widely known recreational region in the northern Great Lakes area. Its core consists of Quetico Provincial Park in Ontario and the Boundary Waters Canoe Area (formerly known as the Superior Roadless Area) of the Superior National Forest in Minnesota (Color Plate I on p. 21).

Its beautiful, peaceful lakes and forests have been the subject of more than 40 years of controversy. The center of this conflict has been the role of wilderness or primitive recreation in the development of the area. Neither Quetico Provincial Park nor the Boundary Waters Canoe Area is strictly defined by the administering agency as a wilderness area. Nevertheless, almost everyone thinks of these two areas as wilderness, at least in the general sense of Webster's meaning: "A tract or region uncultivated and uninhabited by human beings."

This clearly requires an absence of man and his works and poses the paradox of wilderness recreation: the more people visiting a wilderness area,[1] the less it is a wilderness. Mass recreation is possible, but mass solitude is not.

If a wilderness experience is considered socially desirable—and both the United States and Canada have clearly made this decision many times both inside and outside of the government—then the question arises as to the capacity of wilderness areas to provide this experience. Some compromise is obviously necessary between a complete wilderness with no use and the converse of very heavy use with no wilderness qualities left.

As the first essential step is understanding the problem of capacity, this report will describe recreational use and explain it as far as possible. Four aspects will be considered: the number of visitors, the types of visitors, the distribution of visitors over the area, all for 1961, and trends in use. Widely differing opinions have been expressed on all of these subjects during past controversies. This study will not eliminate controversy, but it should provide a better basis for discussion.

A second publication will attempt to relate these use patterns and trends to the capacity of the area for providing the wilderness experience for which it is intended. Questions such as the degree and extent of crowding and conflict between different types of use can only be considered after a description of use has laid the foundation.

The emphasis throughout is upon the Boundary Waters Canoe Area and its closely related fringe (Fig. 1). Necessary supporting data from Canada are introduced, but user interviews were not conducted in Canada and the degree of detail is less. The two parts of the Quetico-Superior are closely related as far as capacity is concerned; this will be true as long as the border can be easily crossed at several points. At the present time parts of the Boundary Waters Canoe Area serve as corridors to Canada for many people. If, in the future, capacity is reached (in the minds of the users) on one side of the boundary, an overflow may affect the other side.

Nevertheless, the emphasis on the American side seems necessary. Not only is capacity a more pressing problem in Minnesota but also there is more use and apparently more conflict between types of use and over policies. Furthermore, less is known about use in the Boundary Waters Canoe Area than in Quetico Park. Entry is completely uncontrolled in the Superior National Forest; there are no check points or travel permits as in Quetico Park. Also Quetico has only six official entrances, while the Boundary Waters Canoe Area has over 60 possible access points (about half with significant use potential), which makes estimating use much more difficult. For both areas estimates are available for recent years on total use but almost nothing on types of use or distribution.

[1] *As used in this study, "wilderness area" in lower case letters means any essentially undeveloped, relatively lightly used land. U. S. Forest Service land officially classified as Wilderness Areas (U-1) or Wild Areas (U-2) will always be capitalized. Quetico-Superior is used here in the narrow sense of Quetico Provincial Park and the Boundary Waters Canoe Area plus the immediate periphery, the waters of which serve as access routes. "The Canoe Country" is a synonym. Border lakes will be used for the larger area from Rainy Lake to Lake Superior (see Fig. 1). The Boundary Waters Canoe Area proper is sometimes referred to in this paper as the Canoe Area and is abbreviated to B.W.C.A. in tables.*

NOTE: *The author, Dr. Robert C. Lucas, is an Economic Geographer on the staff of the Lake States Forest Experiment Station. The Station is maintained at St. Paul 1, Minn., by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of Minnesota.*

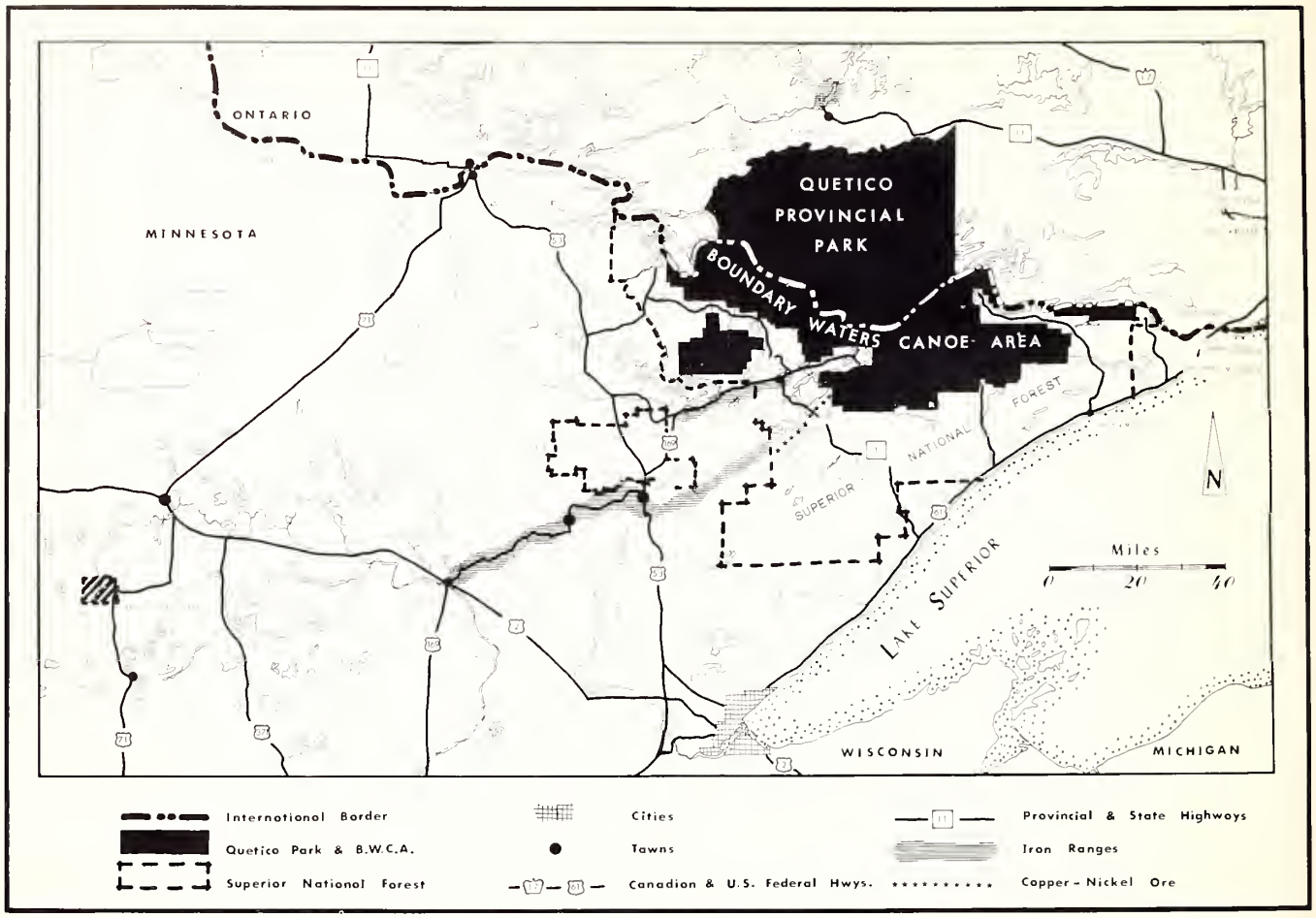

FIGURE 1. — The regional setting.

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FIGURE 2. — Lower Basswood Falls, on the Canadian border is one of the many beautiful falls which are scenic focal points.

Before the use of the Quetico-Superior area can be discussed, the internal or site characteristics and the external relations or situational qualities must be considered to help in understanding the attraction of the area and the influences on its use.

Major Site Characteristics

Location and Size

The Quetico-Superior area straddles the international boundary between the United States and Canada north of Duluth, Minn. (Fig. 1). It extends about 110 miles from east to west, and 60 miles from north to south. Quetico Park is compact, has regular, simple boundaries, and includes 1,132,800 acres. The Boundary Waters Canoe Area is divided into three separate parts. It is elongated, with complex section-line boundaries in most places, and includes 1,038,743 acres of land and water.

The two areas combined total 3,371 square miles, only about 60 square miles less than Yellowstone National Park and about 20 times the area of the Minnesota State Park System in 1961.

Physical Geography

1. *Land forms and drainage*

Lakes are the most essential physical feature related to recreation in the Quetico-Superior. The Boundary Waters Canoe Area is 16 percent water (Superior National Forest 1948, p. 3).[2] There are also many bogs. The streams are usually short and often are wild, white dashes from one dark lake to another (Fig. 2). This tangled drainage is the legacy of the continental glaciation. Old river channels were filled in and new basins were hollowed out or produced by the irregular deposition of glacial drift. Thousands of lakes formed in these new basins.

The shape and orientation of the lakes varies regionally. The most distinctive lake pattern occurs east of a line from Gunflint Lake to Brule Lake (see Plate I on p. 21 for these locations). Almost every lake here is long from east to west and narrow from north to south. Another region of somewhat less elongated lakes, trending northeast-southwest, extends from Ely northeast to Saganagons Lake in Canada. Most of the other lakes are essentially nonlinear or ink-blot shaped.

The Canoe Country varies in elevation from 1,100 to over 2,200 feet above sea level, but local relief is generally not great, although steep short slopes are common. Only about 250 feet separate the highest and lowest points on the U. S. Geological Survey's Ely Quadrangle. The "ridge and valley" section east of Gunflint Lake and Brule Lake has more relief; for example, south of Rose Lake a ridge rises steeply almost 400 feet.

The complex geology of the border lakes country is directly related to recreational use and even to capacity. The lakes and locally sharp relief, together with the forest vegetation, form the scenery, which is a major attraction (Fig. 3). The low relief makes possible the effective concealment of logged areas by leaving a shoreline screen of trees. Such concealment is usually not possible in the mountainous West. Lake size, frequency, orientation, and shape are all related to routes and frequency of contact between parties. The linear lakes usually provide direct and easy routes. The main "voyageur's highway" was over such linear lakes from Grand Portage west to Prairie Portage (into Basswood Lake). On the other hand, these elongated and narrow lakes tend to concentrate routes, almost ensuring that all other groups will be seen. In contrast, the nonlinear lakes with their complex shorelines and abundant islands provide more varied lines of travel and less frequent encounters with other parties within their labyrinths.

2. *Climate*

Relief from summer's heat is often stressed in northern Minnesota's advertising. The July average minimums in the Canoe Country are a pleasant 9 degrees lower than in Chicago, and 16 degrees cooler than in Kansas City—"good sleeping weather."

3. *Forest cover*

The towering red and white pines mentioned so often by admirers of the Quetico-Superior are not common, although a few large specimens here and there add immensely to the beauty of a lakeshore (Fig. 4). The forest today in the Boundary Waters Canoe Area, according to Superior National Forest records, is predominantly jack pine with spruce-fir and aspen following in that order. Only 3 percent of the area has red and white pine as the dominant cover.

This is no longer a virgin forest. The more accessible parts of the Boundary Waters Canoe Area (about one third) were logged between 1890 and 1920 (Superior National Forest 1948, p. 4) and were reforested by aspen and birch. These parts are heavily used for

[2] *Names and dates in parentheses refer to Literature Cited on page 49.*

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FIGURE 3. — This rock-rimmed lake with a forest made up largely of jack pine is typical of much of the Canoe Country.

recreation today because of the same accessibility; therefore, a great many visitors see primarily the less impressive deciduous forest. Due to greater inaccessibility, the early 20th century cutting in Quetico Park was less extensive, and as a result less of the Park is covered with aspen-birch forest.

4. *Animal life*

Big game is not abundant within the Canoe Country, but some species that are rare elsewhere in Minnesota are fairly common here. These animals, such as moose and timber wolves, lend a good deal of color to the country. The black bear is common. Deer are also present and seen quite often by travelers who do not use outboard motors. The loon is the Canoe Country's trade-mark.

Fish are rather sparse, but the more desired species —northern pike, walleyes, smallmouth bass, and lake trout—comprise most of the catch, rather than the panfish that are found in more fertile waters of the south.

Early summer recreation seems to be depressed by mosquitoes and flies, which are much more numerous and bothersome at that time than in late summer.

Land Use

One of the most striking characteristics of this large area is the lack of population and settlement features. The road network outside it unravels and ends near the boundaries. The few temporary logging roads are closed to general travel. No railroads are operating now, although old railroad grades exist. There are almost no permanent residents in either area. A small but decreasing number of resorts and summer homes still exist within the Boundary Waters Canoe Area (in 1963), but there are none in Quetico Park.

A second major feature of the area is its use for recreation. It is noted for a fairly rugged, demanding, "wilderness" type of canoe travel—demanding in both a mental and physical sense. The conventional, less demanding sorts of recreational use are also present—use by visitors from resorts, private cabins, and auto campgrounds outside the Boundary Waters Canoe Area and Quetico Park, who usually travel by motorboat.

All uses involving the production of commodities —logging, mining, and water power generation—are limited by policy, environment, or both.

Logging is the most important of the commodity uses. Two thirds of the National Forest land within the Boundary Waters Canoe Area is now subject to timber sales conducted under special restrictions (Superior National Forest 1948, pp. 14-15), and a number of areas, some quite large, are being harvested.[3] Log-

[3] *For a description of these restrictions and an evaluation of this policy see Lucas 1963.*

ging is also allowed in Quetico-Provincial Park,[4] although almost all the visitors, from the Minnesota side at least, think the Park is closed to cutting. The word "park" probably contributes much to this misconception.

There has been some very small-scale mining activity in Quetico Park and just outside the Boundary Waters Canoe Area, but there is none now. Low-grade copper-nickel ore along the South Kawishiwi River on the Canoe Country fringe (Fig. 1) has been prospected by International Nickel Company but not developed. Titaniferous magnetite in the eastern Canoe Area has also been prospected but left undeveloped.

There is no hydroelectric generation in the Quetico-Superior area now, but a small dam at Gabbro Lake (inside the Boundary Waters Canoe Area) stores water for a dam and generating station outside the Canoe Area. There are remnants of a number of other small crude dams left after logging started early in the 20th century. At least one dam in the Canoe Area has been rebuilt because the water level dependent on it had come to be considered "natural" through long control of the vegetation and navigation (Superior National Forest 1948, p. 17). Four lakes—Moose, Newfound, Sucker, and Birch—are made into one body of water by this dam at Prairie Portage, on the Canadian border.

Agriculture exists at only a handful of spots on the fringes of the area, and is fast disappearing.

Management Policies

These unusual, almost anachronistic qualities exist only because of strong public policies. In the Boundary Waters Canoe Area the management policies are the result of action by the U. S. Forest Service, the Congress, the President, and the courts. The State of Minnesota has enacted similar legislation and has managed the State lands inside the Canoe Area to support Federal policies. Private individuals and groups have played an important role in developing the policies in both countries. The Province of Ontario is the only governmental authority controlling land in Quetico Park. Unlike Ontario, government control in Minnesota, already complicated by three levels of government, is limited by the existence of private land inside the area. Land ownership in the Canoe Area on February 14, 1963, is shown below (from Superior National Forest files).

[4] *Letter from A. B. Wheatley, Acting Chief, Parks Branch, Ontario Dept. of Lands and Forests, to C. R. Williams, Quetico Park Superintendent, dated Feb. 27, 1961.*

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FIGURE 4. — This aerial view of Boulder Bay in the southeastern part of Lac La Croix shows the irregular shoreline of the granite regions and an unusual stand of virgin red and white pine. The lighter colored trees in the background are birch and aspen.

Ownership	*Acres*	*Percent*
Federal	736,204	84.4
State	104,111	11.9
County	14,728	1.7
Private[1]	17,197	2.0
Total land (excluding water)	872,240	100.0

[1]Agreements covering Federal purchase of over 4,000 acres of these private lands have been signed and are being processed.

The Quetico-Superior area is managed to maintain a wilderness setting in the ordinary sense of an undeveloped area, without the complete prohibition of timber production. The objective has been to make possible a wilderness-type experience for visitors, rather than to preserve virgin conditions as an end in itself. This is true in Ontario:

> The recreational policy [in Quetico Provincial Park] is to avoid development in the interior and to confine recreational development to the periphery, where campgrounds and picnic grounds will provide facilities and access by water to the interior for wilderness travel.
>
> The policy concerning logging . . . in essence . . . protects the timber within certain limits of shores, canoe routes, and portages. Such timber may be marked for removal only at the discretion of the District Forester.[5]

It is also true in Minnesota:

> . . . the Superior Roadless Areas constitute that portion of the Superior National Forest where, on account of the abundance of lakes and streams and the opportunity for canoe travel and other recreational pursuits under relatively primitive conditions, the policies and forms of management commonly employed on National Forest land call for modification on a scale requiring the approval of the Secretary of Agriculture.
>
> The general purpose of the plan of management is, without unnecessary restrictions on other uses including that of timber, to maintain the primitive character of the areas, particularly in the vicinity of lakes, streams, and portages, and to prevent as far as possible the further intrusion of roads, aircraft, motorboats, and other developments inharmonious with that aim. (Superior National Forest, 1948, p. 1.)

[5] *Wheatley; see footnote 4.*

The policies are designed to restrict the types of changes that have taken place elsewhere in the northern Great Lakes region. Because of the remoteness of the rocky, swampy, ice-scoured terrain and the general lack of high-quality, easily developed resources, much of the border lakes region was late in developing the roads, railroads, logging, struggling cutover farms, resorts, and crossroads hamlets common in other parts of northern Minnesota, Wisconsin, and Michigan. When such changes began to affect the sizable sections passed over in the first sweep of logging, enough people felt that there was something desirable about the now unique roadless, unsettled waterways to object to the changes.

Briefly the regulations for Quetico Park and the Boundary Waters Canoe Area are as follows:

1. All roads are prohibited, except temporary timber access roads closed to public travel.

2. Travel by airplane to or from Quetico Park or the Boundary Waters Canoe Area by the public is prohibited. Air travel to peripheral points of entry to Quetico Park is allowed. Both countries use planes extensively throughout the area for administration, particularly fire patrol.

3. Motorboats are "prohibited except where the employment of such facilities by the public has been well established" in the Boundary Waters Canoe Area; Quetico Park has no motorboating regulation. To date in Minnesota there has been no statement as to where motorboats are excluded, and no enforcement of the ban.

4. No boats or canoes may be stored on public areas (this began in 1961 in Quetico, and was not generally enforced in Minnesota until 1964).

5. No resorts or summer homes are allowed on government land. In Canada this restriction also applies to a one-mile-wide buffer zone around Quetico Park.

6. Logging of shoreline stands is prohibited. In addition, part of the Boundary Waters Canoe Area is closed to all logging (Fig. 5).

7. Mining will be allowed in Quetico Park only if "the resource is absolutely necessary to the national economy," except for rights acquired before 1956, and "only if it is shown conclusively that it is in the long-term public interest to do so" in the Boundary Waters Canoe Area.

8. Water level alterations through building dams are prohibited in most of the Boundary Waters Canoe Area. The Quetico policy is apparently not written, although the International Joint Commission, which

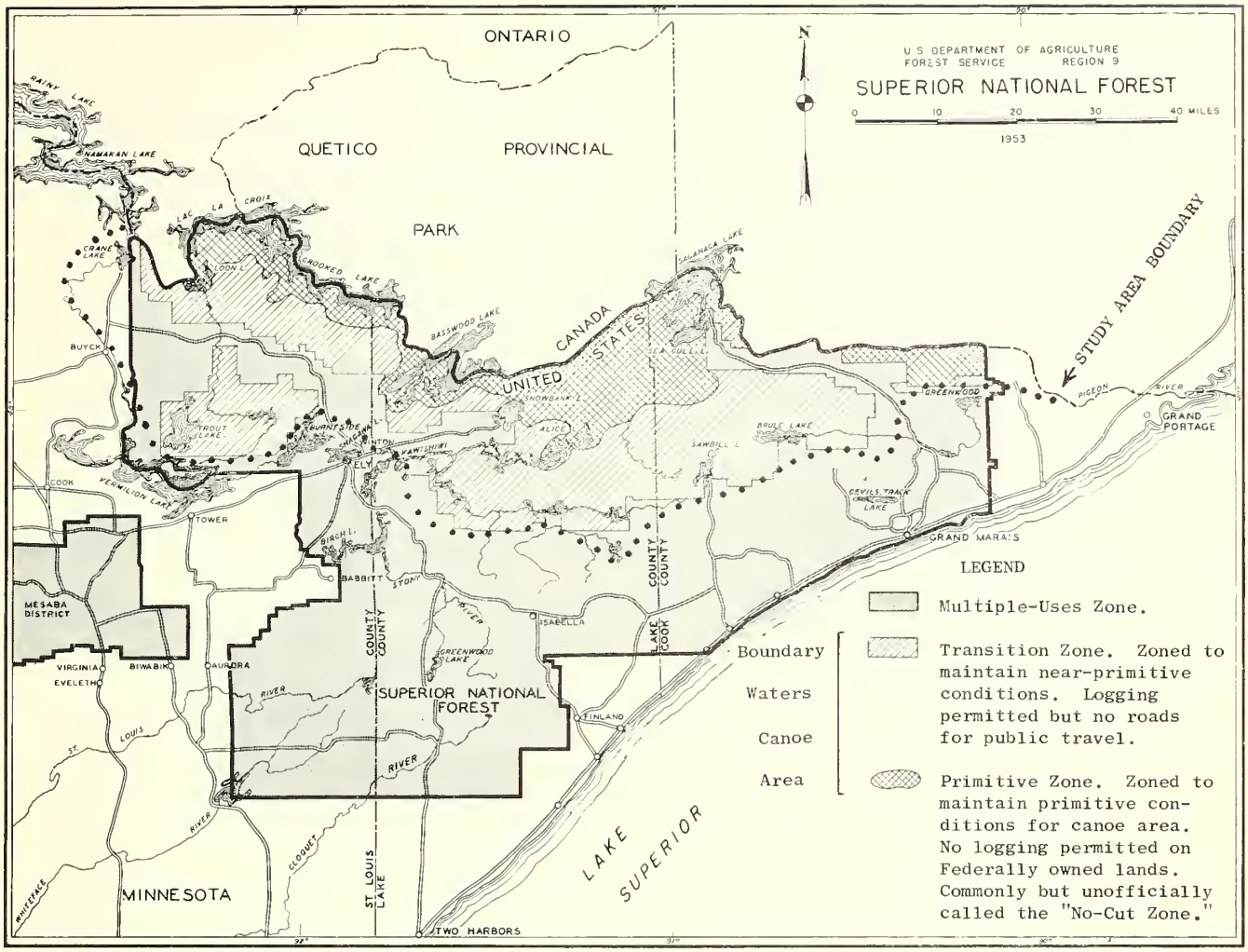


FIGURE 5. — Land use zoning on the Superior National Forest.

is made up of three Canadian and three American citizens ruled unanimously against dams on the Quetico-Superior border waters in 1934.

9. Quetico Park has no legal hunting or trapping (except a few Indian trap lines). Most of the Boundary Waters Canoe Area is now open to hunting and trapping.

10. There are no special regulations on fishing.

11. Developments, such as canoe campsites, portage trails, and docks, are limited and simple. Probably due to heavier use and more motorboat use, the Boundary Waters Canoe Area has more developments and somewhat more elaborate facilities in parts of the area —such as fireplaces, garbage pits, and tables at some campsites.

12. Private land is being purchased or exchanged by the Forest Service to obtain complete public ownership and to eliminate buildings and uses inconsistent with the desired wilderness atmosphere. Land has also been exchanged with other governmental units.

Major Situational Characteristics

Location Relative to Population Centers and Transportation Routes

There is only a small local population near the Boundary Waters Canoe Area, but the population concentrations of the western portions of the American Manufacturing Belt lie no more than 1 to 2 days' drive distant. Chicago is about 580 miles from Ely by road, the Twin Cities about 240 miles.

The Boundary Waters Canoe Area is quite directly linked with the densely populated areas by the highway system, the almost universal means of approach. Since

most visitors come from the south and southeast, the routes focus on the western tip of Lake Superior. The newly opened road around the north side of Lake Superior is longer, and it will probably serve more as an attraction in itself rather than as a route to the Boundary Waters Canoe Area.

Recently highway access to Quetico Park has improved greatly. In 1954, Highway 11 was opened from near Port Arthur to the small mining settlement of Atikokan, on the northern fringe of Quetico Park (Fig. 1). A circuitous route from either eastern or western Canada was still necessary, however. Now Highway 17 along the Lake Superior North Shore brings the Canadian east closer; and an extension of Highway 11 from Atikokan to Fort Frances is being built, which will give the Prairie Provinces direct access. Highway 17 also provides a more direct and shorter route from the central and eastern manufacturing belt of the United States to Quetico's northern entry points. Areas in the United States east of Toledo are now almost as close to Quetico as to the Boundary Waters Canoe Area—only about 100 miles extra driving is required to reach Atikokan instead of Ely.

Location Relative to Other Recreational Areas

Both the Boundary Waters Canoe Area and Quetico Park are surrounded by much recreational land. In Minnesota, however, the surrounding recreational land is more developed. In Ontario large areas of wild land outside Quetico Park are still lightly used. This undoubtedly helps explain why Ontario had few repercussions when private airplane travel was prohibited in Quetico Park, although the same action in Minnesota provoked bitter controversy.

Most officially established Wilderness Areas in the United States are in the Mountain West, remote from the majority of the Nation's population (Fig. 6). These Wilderness Areas are generally even less developed than the Quetico-Superior. Compared to canoe travel, back-packing in the mountains probably is more physically demanding, and using horses more expensive. Most National Parks, which are also usually distant from population concentrations, are much more developed (on a small part of their total area). Thus, the Quetico-Superior is uniquely intermediate to National Parks and National Forest Wilderness Areas in development, easier and cheaper to travel through, and much closer to the users' residences.

For Middle Western people seeking relatively wild conditions, the Quetico-Superior is an intervening opportunity; for those interested in canoeing it has no good substitutes. Land physically similar to the Quetico-Superior is not common in the United States, and much of what is similar has been developed in such a way as to discourage canoe camping. In Canada, on the other hand, alternative areas are more common, more comparable, and closer to populated areas. Algonquin Park, only about 125 miles from Toronto, is also a roadless canoe travel area, although somewhat more developed than is Quetico.

As a result of the distribution of different types of recreational areas, population, and the transport system the Boundary Waters Canoe Area is much more heavily used than the western Wilderness Areas, although less than the National Parks (Fig. 6). Quetico is less used than Algonquin Park, but if only canoeists are compared the difference is small—19,000 in Algonquin and 17,000 in Quetico in 1960 (Quetico Foundation 1960, p. 3).

The relative locational factors lead to predominantly United States use of Quetico Park. In 1960, 89 percent of Quetico visitors were United States citizens compared with only 10 percent at Algonquin (Quetico Foundation 1960, p. 3). Americans were in the majority even at the northern entrance points to Quetico. Canadian use of Quetico Park has increased since auto travel to the Park has become possible, but Americans will probably continue in the majority.

THE STUDY AREA AND PERIOD OF COVERAGE

Data were collected on the use of all of the Boundary Waters Canoe Area and Quetico Park, and also for all of the bodies of water that lay partly inside the two areas. Much of the fringe around the Boundary Waters Canoe Area was also included, so that its three separate parts were joined into a single area (Plate I).

A preliminary field check of use was made from July 1 through Sept. 16, 1960. The main survey was conducted from June 11 through Sept. 9, 1961, and the description of methods refers to 1961. When the records of outfitters, resorts, and youth camps were used, the use figures before and after these dates were kept separate as far as possible.

Although the study period did not cover the full summer season, it did include the period of heaviest use and this was the period of most critical demands upon the resource. The business records of two large canoe outfitters showed that about 90 percent of the canoe trips were taken during the study period.

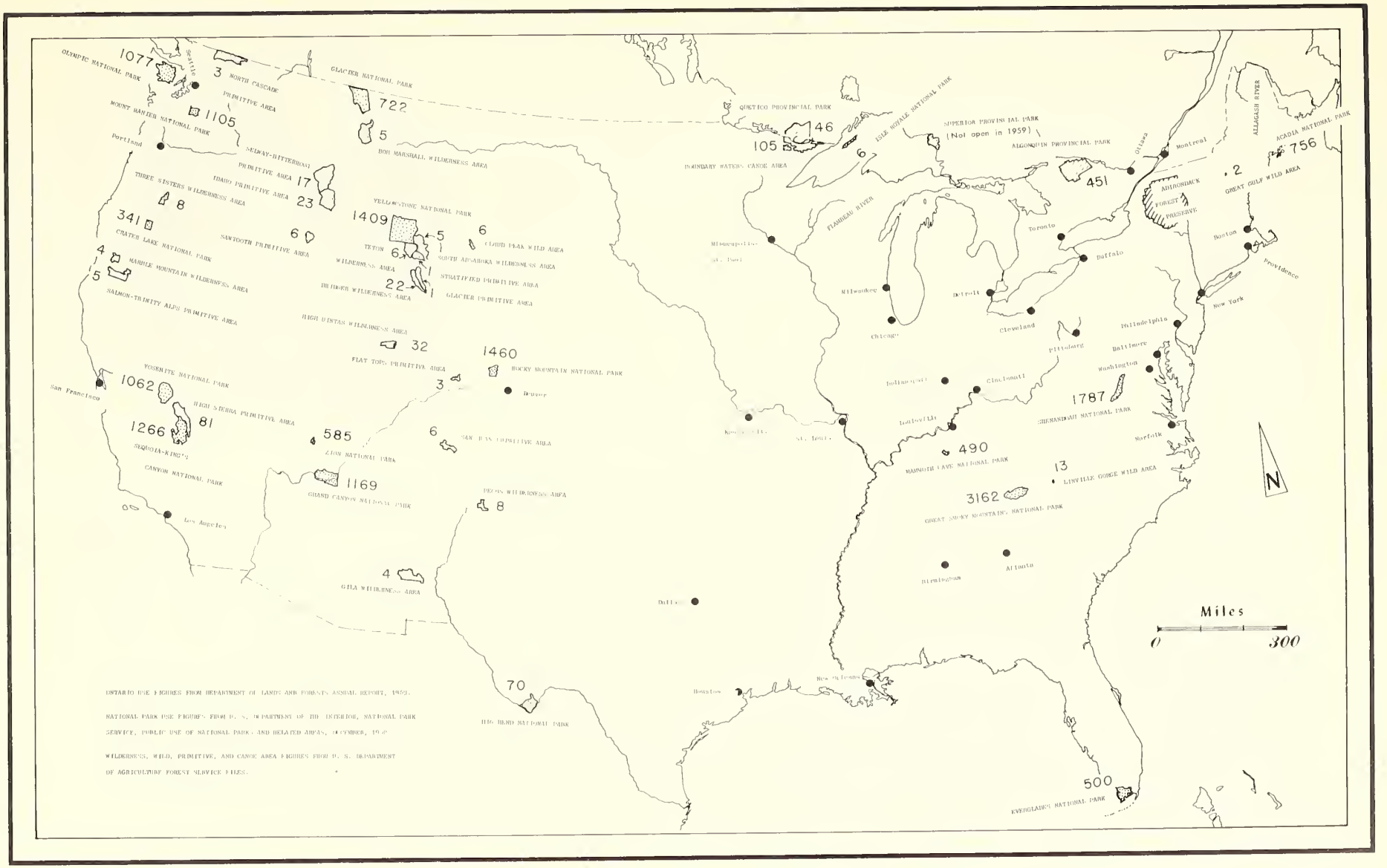


FIGURE 6. — Visits to selected recreation areas, 1959, in thousands.

The spring fisherman use probably differed in distribution, objectives, attitudes, and requirements for satisfaction, and would present a different range of management problems. After Labor Day some local fishing continued, but most campgrounds and many resorts were nearly empty, all youth camps were closed, and the canoe routes were almost deserted.

Off-season use seems to have increased substantially in the short time since the survey was conducted, perhaps in response to main-season crowding. Judging from observations by Forest Service administrators, visitors are coming in much larger numbers earlier in the spring, later in the fall, and, for a very different sort of recreation, in the winter.

METHODS OF DATA COLLECTION

This is a large area with many and diverse kinds of access used by all sorts of people for many different forms of recreation. Since 1955 the people entering Quetico Park have been recorded by means of travel permits, which include a brief description of the approximate intended route. There was no comparable permit system on the Superior National Forest, but many visitors used the services of outfitters, resorts, or youth camps and they appeared in some form in business records. Usually, however, the records were poorly suited for the collection of the kinds of data needed for this study. Many other people never showed up in any records. Almost all campers had their own equipment, and 33 percent of the canoeists in 1961 did not rent canoes locally. Information on these least known types of users is particularly important for National Forest recreation planning.

For these reasons it was necessary to measure use directly. Since the area is so large and the approach routes relatively few, it seemed most efficient to check the users where they were concentrated on these approaches rather than over the entire area (Plate I). Methods will be briefly described here; details of the sampling design, estimating procedures, and questionnaires are available in mimeographed form upon request to the Station.

The six road-checkpoints chosen covered all but one of the major access points. A simple cumulative pneumatic traffic counter was installed at each location. A 3-foot square sign alerted drivers who were then stopped and interviewed briefly, using a one-page form (Fig. 7). Motorists cooperated very well; only 3 cars out of almost 4,000 refused to stop.

Only outbound daylight (between 8:00 a.m. and 8:00 p.m.) traffic was sampled. This was a minor problem because night traffic was light. However, at night some kinds of recreation probably made up a somewhat smaller proportion of traffic than they did during the day.

Interviews were conducted at the four main checkpoints on 14 randomly selected days, twice on each day of the week. At two minor points, each day of the week was checked only once.

Total traffic for most of the study period was determined directly from the traffic meter readings. The counters were new and quite accurate, and none failed mechanically during 1961. A correction was made for cars pulling trailers and multi-axle trucks, and the corrected total was halved on the assumption that over a 13-week period inbound and outbound traffic were equal. This gave an estimate of over 89,000 outbound vehicles, almost 4,000 of which were checked. Use—amount, type, and location beyond each checkpoint—was estimated by applying the percentages derived from the interviews at that point to the outbound traffic total for that point.

Only one important access point was not covered by the road checkpoints. This was Winton, a town of 200 people on Fall Lake. A road-check was unsuitable because there was no place where recreational vehicles could be checked without also stopping many local drivers. Almost all users appeared on business records, which were checked. One small parking area, not officially a public access, was used by the public. License plates were recorded daily to count groups and measure length of stay, and interviews with a sample of people

F-500003

FIGURE 7. — Recreationists leaving the study area were interviewed briefly. Motorists cooperated very well.

returning to their cars gave a basis for estimating types of use.

There were other minor points not covered fully by road checkpoints (Plate I). Business records, all-day checks on portages, and parking lot counts were all used for these lightly visited locations.

The several young people's camps in the study area all used the Canoe Country. Their use was taken directly from their records, and cooperation was complete.

An error term cannot be computed, but a number of cross-checks suggests that it would be small.

Use distribution was estimated from several types of data. Information was collected in the roadside survey on the location of accommodations used and all water areas visited. In addition, 292 long interviews were carried out with a sample from all classes of visitors except auto sightseers. The sample covered the entire study area, except French Lake, Ontario. Detailed information on areas visited was obtained. (This questionnaire also dealt with visitor characteristics and attitudes.) At minor points, where very few groups were contacted, 107 self-addressed forms and maps left on windshields of parked cars supplemented interviews. Almost all of the people filling out these forms were canoeists, and the 79-percent rate of return suggests the depth of their involvement with the area.

The roadside forms were not generally used for mapping canoe routes because canoe routes were often long, complex, and difficult to describe accurately during a necessarily brief interview. For all other types of use, all of the forms were combined to determine the patterns of travel for visitors entering at each access point.

AMOUNTS OF USE

Visitor Totals[6]

An estimated 132,400 people visited the study area from June 11 through Sept. 9, 1961, and all but 3,400 entered the area from the south through Minnesota. Of this total, 51,300 visited only the part of Minnesota outside the Boundary Waters Canoe Area, and did not go to Canada. Another 5,300 visited Minnesota and Canada, but bypassed the Boundary Waters Canoe Area. Those who actually entered the Boundary Waters Canoe Area totaled 72,400, and 25,100 of these crossed the border into Canada, almost all into Quetico Park. The 3,400 who entered from the north came in by way of French Lake, Ontario, and visited only Quetico Park.

Types of Recreation

Visitors were classified on the basis of kind of accommodations used (where they laid their heads at night), and those who camped out on the waterways were further divided into users of boats and canoes (Table 1). A small number of parties used more than one type of accommodation. For example, a few canoeists camped in an auto campground at the beginning or end of their trip. These groups were classified on the basis of the dominant type of accommodation.

Several points in Table 1 may be emphasized. First, for each part and for the study area as a whole the canoeists (by which is meant people who go on canoe trips, or canoe campers) formed the largest class, and over two thirds of these people paddled. However, if all of the people using motorboats were combined, it would seem that the Canoe Country is really motorboat country (Table 2). The proportions in Table 2 when applied to Table 1 led to the following estimates of visitors by type of back-country travel.

	Boat	*Canoe*	*Neither*
Study Area	61,400	44,600	32,000
Boundary Waters Canoe Area[1]	37,500	38,200	0
Quetico Park	15,700	20,100	0

[1]Several hundred people entered this area by horse, and usually later used boats or canoes. A small number hiked in.

In the study area only about three-fourths as many people canoed as used motorboats, and half as many used neither. Even within the Boundary Waters *Canoe* Area, individuals using motorboats almost equalled those using canoes. Quetico Park had somewhat less boat use, proportionately. The figures all add up to slightly more than total visitors because some people used both boats and canoes. However, most *visits* to

[6] *Visitor here means a person who leaves home to visit the study area. A person is counted as a visitor once, and once only, every time he does this. This differs from the Forest Service statistical unit, the "visit" which involves counting a person each time he enters a reporting unit, such as the Boundary Waters Canoe Area, even from a resort or campground on the same lake outside the unit. The 72,400 visitors made 193,000 visits, so defined, to the Boundary Waters Canoe Area during the 1961 study period. This is almost twice the number of visits estimated by the Superior National Forest for 1960.*

TABLE 1. — *Estimated number of visitors, June 11 through Sept. 9, 1961*

Type of visitor [1/]	Total study area	Total Minnesota study area	Boundary Waters Canoe Area	Quetico and fringe
Canoeists:	32,100	31,700	30,700	15,000
Paddling	22,900	22,600	22,300	10,500
Motorized	9,200	9,100	8,400	[2/] 4,500
Campground campers	14,400	13,400	7,700	2,600
Boat campers	13,500	12,500	7,800	4,400
Resort guests	25,900	25,900	16,000	8,400
Private cabin users	7,700	7,700	3,000	2,000
Other overnight users	500	500	500	100
Day users	11,100	10,100	6,700	1,300
Auto sightseers	27,200	27,200	0	0
Total	132,400	129,000	72,400	33,800

1/ The boat-camper category includes about 350 people who camped at undeveloped sites at the ends of minor roads, rather than out on the lakes. Houseboats are classed with resorts here and in subsequent tables. Day users include all 1-day use by people staying at their homes or driving in from resorts and so on outside the area, except auto sightseers. The columns are not mutually exclusive: for example, everybody counted in the B.W.C.A. is also counted in the Minnesota study area. Quetico Park statistics are based on this survey except for French Lake, for which travel permits supplied by the Ontario Department of Lands and Forests were checked.

2/ Does not include a large, but unknown, number of people who did not travel beyond French Lake.

TABLE 2. — *Percentage of groups in selected recreation classes using boats and canoes*[1]

Type of visitor	Groups in sample	Boat only	Canoe only	Both	Neither
	Number	Percent	Percent	Percent	Percent
Study area:					
Campground campers	96	46	28	4	22
Boat campers	24	92	0	8	0
Resort guests	53	85	6	9	0
Private cabin users	21	71	0	29	0
Day users	9	56	0	0	44
Boundary Waters Canoe Area:					
Campground campers	53	56	38	6	0
Boat campers	24	92	0	8	0
Resort guests	49	84	4	12	0
Private cabin users	14	79	0	21	0
Day users	3	100	0	0	0
Quetico Park: [2/]					
Campground campers	4	25	50	25	0
Boat campers	6	83	0	17	0
Resort guests	14	79	14	7	0
Private cabin users	3	67	33	0	0
Day users	2	100	0	0	0

1/ Data are taken from long-interview forms.

2/ Also includes a small number of users of Canada immediately east or west of the Park but within the study area.

the Boundary Waters Canoe Area were by boat (117,000 compared to 76,000 that used canoes).

Except for the canoeists, boat campers, and the few visitors to resorts or cabins inside the Boundary Waters Canoe Area, all visits were quick forays from the fringe, in and out again the same day. About 41 percent of the visitors to the Boundary Waters never stayed overnight in the interior: this group made some 118,000 of the 193,000 visits. This was unexpected. Official estimates of average length of stay per visit (Forest Service definition) to the Canoe Area has been as high as 5 days, but the true value appears to be only about 1.75 days. A large area has been set aside for people to drink deeply of the wild landscape, but many only sip. The same predominance of brief, marginal visits is quite possibly characteristic generally of Wilderness Areas, National Parks, and other undeveloped recreation areas.[7]

[7] *Research by the Pacific Northwest Forest and Range Experiment Station had indicated a somewhat similar situation in Oregon Wilderness Areas. In the Three Sisters Wilderness Area, 80 percent of all visits were day-visits, but because the Three Sisters is much smaller than the Boundary Waters Canoe Area, a larger proportion of these people reached the central parts. (From unpublished findings.)*

Auto sightseers are almost as numerous as canoeists. The most common form of outdoor recreation in the United States (and probably in Canada) is viewing the outdoors through a car's windshield (Outdoor Recreation Resources Review Commission, 1962a, Table 1), but it is somewhat surprising to find so much of it here, in an area which is famous for very active recreation and where nothing has been done to provide for auto touring. Perhaps the wilderness lures these drivers on, even though they do not enter the established area.

Almost as many campers camped away from the auto campgrounds as in them (not counting canoeists as campers). Within the Boundary Waters Canoe Area the boat campers outnumbered the people visiting the Canoe Area from the fringe auto campgrounds.

The use of the Quetico-Superior by resort guests was heavy. People entering the Canoe Country from the fringe resorts outnumbered those from the resorts located inside the Boundary Waters Canoe Area 3 to 1. These resorts on the edge of the wilderness have an advantageous situation unique in the Lake States.

DISTRIBUTION OF USE

The distribution of use is described here primarily by means of maps. First, use is classified as before by type of accommodations used, with a further subdivision of visitors who camped within the Canoe Country into paddling and motor canoeists, and boat campers. Next, use is classified by type of water travel (boats or canoes). Looking at use in these two different ways provides a better understanding of factors that seem to influence the patterns and also shows some important relations to the capacity problem. A map of the dominant type of use (motorboating or canoeing) and a map of total use are also included. The patterns are analyzed in the section following the descriptions.

All of the discussion of use distribution is in terms of groups. Groups can be converted to number of individuals or man-days by using the average group sizes and stays given in Table 3. A *group* refers to people staying in or traveling through the study area together—a family, several friends, a Boy Scout troop, or even a lone person.

Use by Type of Accommodations

The distribution of each type of use (except auto sightseers) is mapped, and the major features of each map are pointed out below. The two types of canoeists (paddlers and motorized) show similar patterns. Auto campers are distinct, but boat campers, resort guests, and visitors to private cabins all were distributed in much the same way. The day users were distributed differently than the other types, and so were auto sightseers.

Paddling Canoeist Use

Paddling canoeists were concentrated in the central area, and access points varied more in amount of use than was true for any of the other types of visitors (Plate II). Over 2,600 groups paddled Moose Lake, the most heavily used area. No other type of use reached such a high level on any lake.

Use gradients were gradual, and virtually all of the area was used. Three axes from Moose Lake—east, north, and west—were followed by moderately large numbers of paddlers much farther than by any other visitor types. Even as deep as Kawnipi Lake, 25 miles to the north, canoeist use was heavier than on any access lake except Moose. All of the southern study-area fringe, however, was very lightly used. Unused areas were generally not the most remote, but rather smaller, cul-de-sac lakes scattered widely. Use

TABLE 3. — *Average group size and length of stay for major visitor classes, June 11 through Sept. 9, 1961*[1]

Visitor class	Average group size (individuals)		Average length of stay[2] (days)	
	Study area	B.W.C.A.	Study area	B.W.C.A.
Canoeists:	4.7	4.7	6.8	4.8
Paddling, no youth groups	4.3	4.3	7.1	5.1
Paddling, youth groups	10.0	10.0	8.6	5.0
All paddling canoeists	5.0	5.0	7.2	5.1
Motorized	4.0	4.0	5.7	4.2
Campground campers	3.7	3.7	4.0	4.3
Boat campers	3.6	3.6	4.2	3.9
Resort guests	3.5	3.3	5.8	5.1
Private cabin users	3.4	3.3	6.2	5.7
Day users	3.0	2.7	1.0	1.0
Auto sightseers	3.3	0	1.0	0
Total	3.7	3.9	4.1	4.4

1/ Data on Quetico Park were not separated.
2/ This refers to the total stay in the area, not the Forest Service "visit." Any part of a day was counted as a whole day for sample groups. For example, a group that entered the study area at 10:00 p.m., camped, and left at 8:00 a.m. the next morning, was credited with a 2-day stay. From roadside survey and business records.

from French Lake in Quetico Park overlapped use from the south only slightly.

Motor Canoeist Use

The distribution of motor canoeist use (Plate III) was similar to that of paddling canoeists, but use was at a lower level—only about 40 percent as great. The percentage using Moose Lake was almost as high.

The use gradients, however, were steeper than for paddlers, and a large area, particularly in Quetico Park, and some sections of the Boundary Waters Canoe Area were unused. Like the paddlers, motor canoeists made only light use of the southern area. Use from French Lake did not overlap use from Minnesota.

Auto Campground Use

Plate IV shows the use of the lakes and rivers of the study area by people who used the auto campgrounds. Because only 85 percent of these groups used the lakes, the map does not show the use of the campgrounds themselves; this information is included in Table 4.

The distribution of camper use was extremely uneven, ranging from an estimated 20 to 790 groups per campground. For some places it was very heavy relative to the number of family camp units. Use of the lakes also tended to be very uneven (Plate IV). A very large part of the study area was not used by auto campers at all. Few portaged from the lakes or rivers on which the campgrounds were located; total groups over the first portage were only 18 percent of those who used the fringe waters.

Boat Camper Use

Boat camper use reached moderately heavy levels (Plate V), especially at Crane and Sandpoint Lakes in the west. All of the road-end lakes, including French and Pickerel Lakes in Quetico Park, had moderate use, and so did most of the border lakes. Boat campers did not use most of Quetico Park, the Fernberg to Gunflint area, and smaller areas along the Echo Trail. The southern edge of the study area, especially the central area, was very lightly used. Use gradients were steep.

Resort Use

Use by resort guests was heavier at the most popular locations than was auto or boat camper use, but again the distribution ran to extremes (Plate VI). There was a steep gradient from heavy use on the lakes where resorts were located to light use or no use

over the portages, although the decline was not as steep as for campground users. The only exceptions were the several mechanized portages, most of which were heavily used by boaters. Rail or truck portages were particularly important at Trout Lake, Lac La Croix, and Basswood Lake. An almost continuous band of resort use on the border lakes tied together the three lobes of a distribution which was otherwise mainly close to the roads. Crooked Lake and Knife Lake were lightly used links in this border chain.

The northwest portion of Quetico Park had some resort use based on seaplane service to the Beaverhouse Lake Park entry point, mainly from the Crane Lake resorts.

Resort guests did not use most of the study area. The sample did not show any resort use in a large block of Quetico Park, a fairly large portion of the Boundary Waters Canoe Area between the Fernberg Road and the Gunflint Trail, and a narrow band between the Echo Trail and the border lakes. About 38 percent as many groups used lakes beyond one unmechanized portage as used the fringe lakes.

Private Cabin Use

Private cabin use (Plate VII) was similar to that of boat campers and resort guests. It was spotty and generally light (except in the west at Crane and Sandpoint Lakes), and covered only a small part of the Boundary Waters Canoe Area and almost none of Quetico Park. The large south-central part of the Boundary Waters Area was unused. There was little use of the lakes beyond the road-accessible fringe and the lakes reached by mechanized routes, so that the use gradient was abrupt.

TABLE 4. — *Number and use of developed family camp units; percent using the lake or river on which the campground is located; June 11 through Sept. 9, 1961*

Campgrounds 1/	Developed units	Total groups	Groups per unit 2/	Percent using the lake or river
Lake Jeanette	8	360	45	86
Meander Lake	3	20	7	100
Portage River	3	40	13	0
Nels Lake	0	90	-	100
Fenske Lake	14	110	8	67
Fall Lake	0	100	-	100
Moose Lake	6	270	45	89
Lake One	5	100	20	100
Kawishiwi Lake	5	50	10	100
Sawbill Lake	30	540	18	100
Brule Lake	2	70	35	100
East Bearskin Lake	9	200	22	90
Flour Lake	9	150	17	77
Iron Lake	6	170	28	27
Trail's End	39	790	20	81
McFarland Lake	3	110	37	100
Total	142	3,170	21	3/ 85

1/ All of the Minnesota campgrounds are the responsibility of the Superior National Forest except the last, McFarland Lake, which was built by Cook County. There was only one campground adjacent to Quetico Park, at French Lake. It had 110 family units, and an estimated 245 groups camping there visited Quetico Park.

2/ Data for Nels and Fall Lakes were omitted because neither had developed camping units (fireplace, table, tent space).

3/ The 85-percent figure, as well as all of the other data in this table, comes from the roadside sample. The smaller campground sample used for table 2 indicated 78 percent used the lakes.

One-Day Use

Use by people who did not stay overnight in the study area was limited to the outer margins of the Canoe Country and was nowhere heavy (Plate VIII). It was not, however, as marginal as auto campground use; Basswood Lake and Lac La Croix were reached by day visitors but not by sample campground users. Fall Lake, rather than Moose or Crane Lake, had the heaviest use. (Use for swimming or fishing from the shore was not mapped as use of the lakes.) Pickerel Lake in Quetico also had considerable day use.

Auto Sightseeing

Auto sightseers, by definition, did not stay overnight in the study area nor use the lakes. The number of groups sightseeing on each of the six roads at the checkpoint locations is given below (estimated from the roadside survey):

Road	*Total Groups*
Crane Lake Road	780
Echo Trail	1,080
Fernberg Road	1,880
Sawbill Trail	750
Gunflint Trail	3,110
McFarland Road (Arrowhead Trail)	650
TOTAL	8,250

The variation appears substantial, but in fact this was the most evenly distributed of all the uses. The three most used locations were all on blacktop.

Use by Type of Water Travel

Use of boats and canoes cuts across the accommodation classification to some extent. Canoeists, of course, used canoes, but auto campers used both boats and canoes substantially (Table 2). The other accommodation types were mainly boat users, but not exclusively so. The type of craft used strongly affected the circulation patterns beyond the access points, regardless of the type of accommodations.

Canoe Use

Total canoeing (Plate IX) differs only in detail from the maps of paddling canoeists (Plate II) and motor canoeists (Plate III). The largest increase is near the two largest campgrounds: Trail's End between Saganaga and Seagull Lakes, and Sawbill Lake. Canoe outfitters adjoined both of these large campgrounds. Axes of very heavy canoe use led from Moose Lake northeast to Saganaga, and Moose Lake north to Agnes. Heavy use was also made of the waterways from Fall Lake north to Basswood and west along the International Border, and in a circle east from Moose through Insula and back west to Lake One. Almost all of the study area was visited, but the southern margin was lightly used everywhere except Sawbill Lake.

Motorboat Use

The distribution of all motorboat use (Plate X) is a map of extremes. Some sections were heavily used, especially along the western International Border, but most of the area was not visited. Levels of intermediate use were rare: unused lakes lay next to very heavily used waters. A large area in Quetico Park had no boats, but the only sizable boatless section in Minnesota was between the Fernberg Road and the Gunflint Trail.

Dominant Use

The maps of canoeing and motorboating are the bases for the map of dominant use (Plate XI). Canoeing dominated most of the area; but in general wherever motorboats were used at all, boating dominated. There were some exceptions, particularly Moose Lake and Lake One, but these were the only lakes directly accessible to boats where canoeing groups outnumbered boaters. The large border lakes with mechanized portages were boat-dominated except for Crooked Lake. In Quetico Park, away from the International Border, only Pickerel Lake had more boats than canoes. The proportion of the Boundary Waters Canoe Area used mainly by boating groups was higher than for Quetico Park.

Total Use

Total use by all types of visitors (Plate XII) was heavy on the border lakes from Crane Lake east to Saganaga (with lighter use on Crooked Lake); from Moose Lake and Fall Lake north to Agnes and Kawnipi; from Moose and Lake One east halfway to the Gunflint Trail; on and near Sawbill, Seagull, and McFarland Lakes; on Trout Lake; and on Pickerel Lake. The map could be generalized as showing particularly heavy use where roads or mechanized portages reached large lakes and on the two heavy axes from Moose Lake to Knife Lake and from Moose Lake to Kawnipi Lake.

FACTORS RELATED TO USE DISTRIBUTION

Explaining the distributions that have been described involves two aspects: visitors' choices of starting points or bases of operation, and how far and which way they go from home base. Different factors seem related to each of these aspects. Choice of starting point differs primarily with the type of accommodation used, and each type is discussed here. The next section considers movement out from starting points, which differs with the type of water travel—boat or canoe.

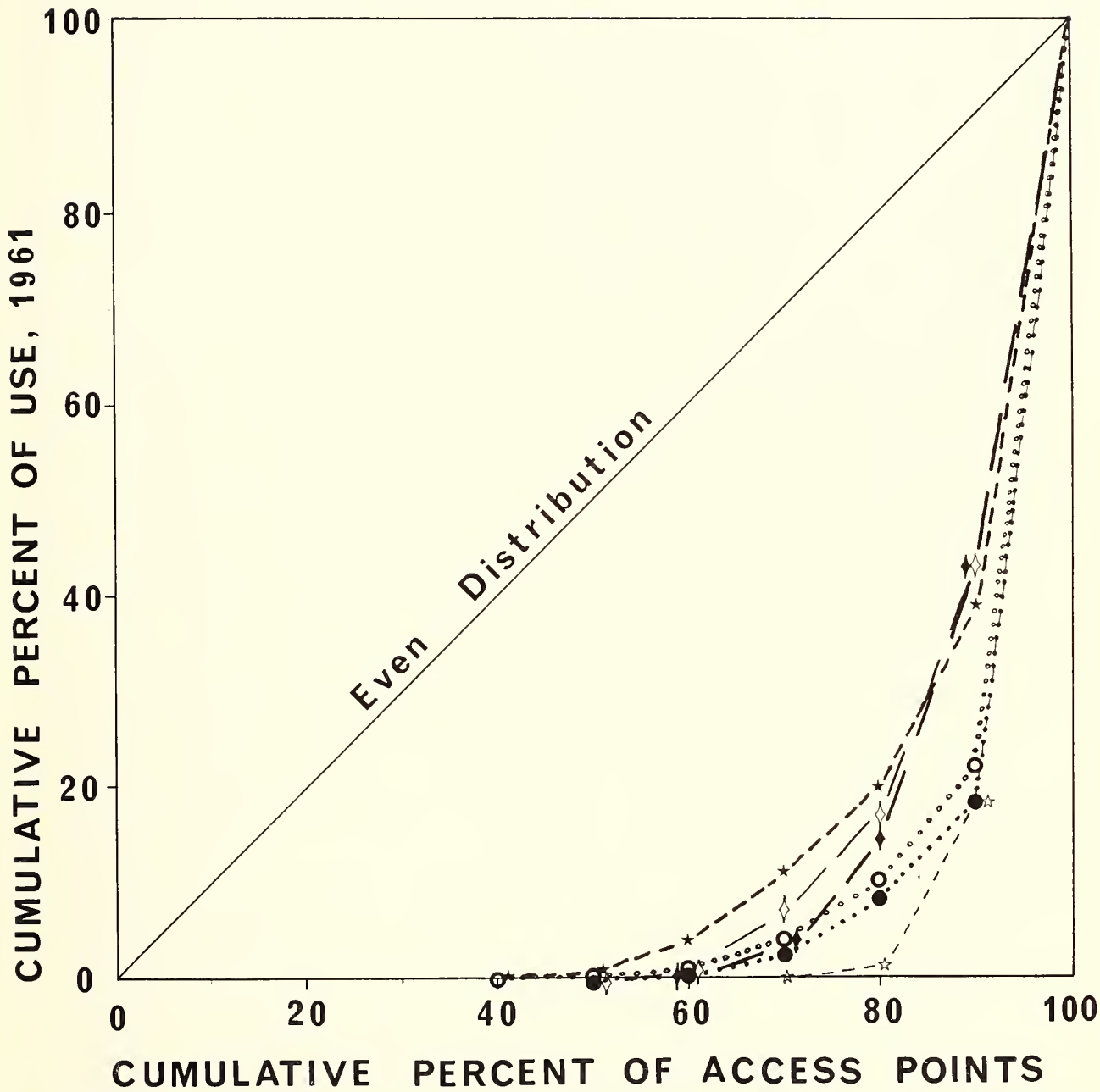


FIGURE 8. — The concentration of access point use in 1961 is shown on this Lorenz diagram. If every access point were used equally, that use would be represented by a line at 45 degrees through the origin. The more a line deviates from the 45-degree line, the more uneven (concentrated) that use is.

TABLE 5. — *Characteristics of access points in relation to number of paddling canoeist groups using the points, June 11 through Sept. 9, 1961 (data for Moose Lake omitted)*

Characteristics of access points	Number of access points		Number of groups using the access points		
	Used	Unused	Average[1/]	Minimum	Maximum
INDIVIDUAL CHARACTERISTICS					
1. Portage from car to water:					
None required	28	17	78	0	426
One required	5	11	47	0	110
2. Type of waterbody:					
Large lake[2/]	16	3	121	0	426
Small lake	12	19	22	0	83
River	5	6	47	0	110
3. Relation to major route: [3/]					
On a major route	23	7	99	0	426
Not on a major route	10	21	16	0	45
4. Portage to Canada: [4/]					
One or less	6	0	191	17	426
Two or more	27	28	47	0	211
5. Portage to Quetico: [4/]					
One or less	3	0	314	247	426
Two or more	30	25	50	0	211
6. Canoe outfitter[5/] at access point:					
Yes	15	2	135	0	426
No	18	26	23	0	110
COMBINED CHARACTERISTICS					
A. Direct access, large lake on route, Quetico close, outfitter[4/]	3	0	314	247	426
(With Moose Lake)	4	0	897	247	2,644
B. Direct access, large lake, on route, outfitter	7	1	120	0	211
C. Direct access, large lake, on route	3	0	21	8	38
D. Direct access, large lake, outfitter	1	0	10	-	-
E. Direct access, large lake	1	1	5	0	5
F. Direct access, small lake, on route, outfitter	2	1	56	0	83
G. Direct access, small lake, on route	3	2	13	0	20
H. Direct access, small lake, outfitter	1	0	45	-	-
I. Direct access, small lake	3	6	7	0	10
J. Direct access, river, on route	1	2	15	0	15
K. Direct access, river	1	2	33	0	33
L. Portage access, large lake, on route	0	1	0	-	-
M. Portage access, small lake	3	10	16	0	22
N. Portage access, river, on route	3	0	62	16	110
O. Portage access, river	0	2	0	-	-

1/ Average computed only for locations that were used.
2/ Large lakes were over 3 miles long.
3/ Major routes were those shown on the 1958 Boundary Waters Canoe Area recreation map issued by the Forest Service.
4/ Pickerel Lake, Ontario, was omitted; 71 groups were estimated there.
5/ Young people's camps were considered as "outfitters."
6/ "Direct access" as used here means "no portage from car to water." Characteristic No. 4 (one portage from Canada) was not considered.

Factors Related to Use of Starting Points

Starting points were used very unevenly by all visitor types. Ten percent of the access points accounted for over half of every major type of use (Fig. 8). Auto camping was the most concentrated type. Auto camping, resort use, and private cabin use all depend upon fixed improvements. Therefore, the number of lakes with campgrounds, resorts, or cabins largely explains the shape of the three curves in Figure 8. Nevertheless, resort and private cabin use of marginal lakes was *more* dispersed than use by canoeists, especially motor canoeists. Boat camper use and resort guest use of access points were the most evenly distributed.

Paddling Canoeist Use

Within the study area, 62 places provided possible starting points for canoe trips, but only 34 of these had measured use. Use pressure varied in the extreme. Of the estimated 5,100 groups of paddling canoeists, 52 percent started from Moose Lake. Although Fall Lake was second highest, it had only 8 percent of the total. Saganaga Lake was the only other point where as many as 5 percent began their trips.

Explaining this distribution becomes mainly a problem of explaining Moose Lake's heavy use.

The Boy Scouts maintained the largest young people's camp in the study area on Moose Lake, but this accounted for only 230 of the estimated 2,650 groups using Moose Lake as a gateway. Moose Lake has everything: two canoe outfitters located directly on the lake, several resorts that rented a few canoes, a campground and public access point, the Scout canoe base, a direct water route to Canada and a Quetico Park entry point, and three important canoe routes fanning out in Minnesota (or along the border) plus three or four more routes into Canada. It is deep in the Canoe Country and, unlike many of the unused access lakes, it is at the end of the line and cannot be bypassed on the road to start at some deeper spot.

The attraction of Quetico Park was extremely strong. Almost three fourths (73 percent) of the canoe parties that paddled out from Moose Lake went through Prairie Portage and into Quetico Park. By way of comparison, only about 30 percent of all paddling canoeists starting in Minnesota at all other access points went to Canada. Prairie Portage was the most used of the four Ontario Lands and Forest Ranger Stations on the border.

Table 5 shows the relation of use of starting points to six locational characteristics, first taken singly and then grouped. The consideration of each factor in isolation is not completely satisfactory because of unstudied interactions between factors. Because Moose Lake is unique, it is omitted.

Access points within one portage of Quetico Park (item number 5 in the table) seemed most heavily used. Location relative to Canada in general seemed less related, although still strong, as was the presence of an outfitter, location on a large lake, and location on a major route. Direct access (no portage from parking lot to water) was associated with only slightly higher than average use.

The combination of the six characteristics would produce a cumbersome classification, and to reduce the number, access to Canada was omitted in the lower part of Table 5 because it was less related than Quetico Park access. The distinction between the lakes with all five qualities and all other locations seemed large, even without Moose Lake. As the number of portages to Quetico Park increased, use dropped, even though all other qualities were still present (B, Table 5). Where outfitting was absent use dropped sharply again, even where there was direct access. Only Moose River and the Little Indian Sioux River (N, Table 5) had much use where direct access and outfitting were both lacking. The one large lake without direct access (L, Table 5) was Trout Lake, reached across big, heavily used Lake Vermilion; this atypical location was unused.

Inspection of Plate II also indicates a tendency to neglect starting points not leading to routes to the north. The entire area south of the Echo Trail was almost unused. Travel was possible upstream on both the Little Indian Sioux River and the Moose River, but only one sample party used the upper Moose River and none used the upper Indian Sioux. Other starting points on routes not heading northward, such as the North and South Kawishiwi Rivers and Isabella River, had relatively little use. Access points in the eastern slate area, with its east-west grain, were not heavily used. Of the starting points without a strong northward orientation, only Lake One and Sawbill Lake, both of which have resorts, outfitters, and campgrounds, had much use.

Distance from place of residence was not associated with declining use. Nearly half of the paddlers resided in Minnesota, but few local people paddled canoes. (Figure 9 and Table 6 together show distribution of visitors by place of residence.) Since about 90 percent of the paddlers lived south of Duluth, road mileage from Duluth to the access points was taken as a measure of relative remoteness. No relationship was apparent (Fig. 10). This is an exception to the location theories describing consumer behavior. It suggests that recreation, or at least wilderness recreation, is quite different from other services. Gravel road mileage also seemed unassociated with use.

The bulk of the paddling canoeists seemed to have rather strong and similar preferences for access points:

TABLE 6. — *Place of residence of individual visitors, by types*[1]
(Percent)

Place of residence of individuals	Canoeists		Campers		Others		
	Motor	Paddle	Auto	Boat	Resort guests	Private cabin	Day use
Minnesota:[2]							
Local	6	*	2	6	*	6	43
Other NE Minn.	13	11	26	28	10	26	30
Mpls.-St. Paul S.M.A.	28	24	49	32	33	23	10
Other Minnesota	9	11	8	17	6	13	3
Total	56	46	85	83	49	68	86
Dakotas	5	1	*	0	*	0	0
Iowa	5	4	*	5	7	2	1
Chicago S.M.A.	13	9	3	1	16	7	3
Other Illinois	6	4	1	1	6	0	3
Superior, Wis.	1	0	1	2	1	0	0
Other Wisconsin	7	12	3	2	5	2	3
Mich., Ohio, Ind.	3	9	3	4	9	15	0
Mo., Kans., Neb.	2	11	1	2	3	2	0
Northeast[3]	0	0	1	*	1	2	0
South[4]	2	4	*	0	3	1	4
West[5]	0	*	1	*	0	0	0
Canada	0	0	0	0	0	1	0
Total outside Minnesota	44	54	15	17	51	32	14

* Less than half of one percent

1/ Based upon roadside sample data, and excluding visitors to young people's camps.

2/ See figure 21 for definitions of areal categories in Minnesota.

3/ Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.

4/ Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

5/ Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, California, Oregon, Washington, Hawaii, and Alaska.

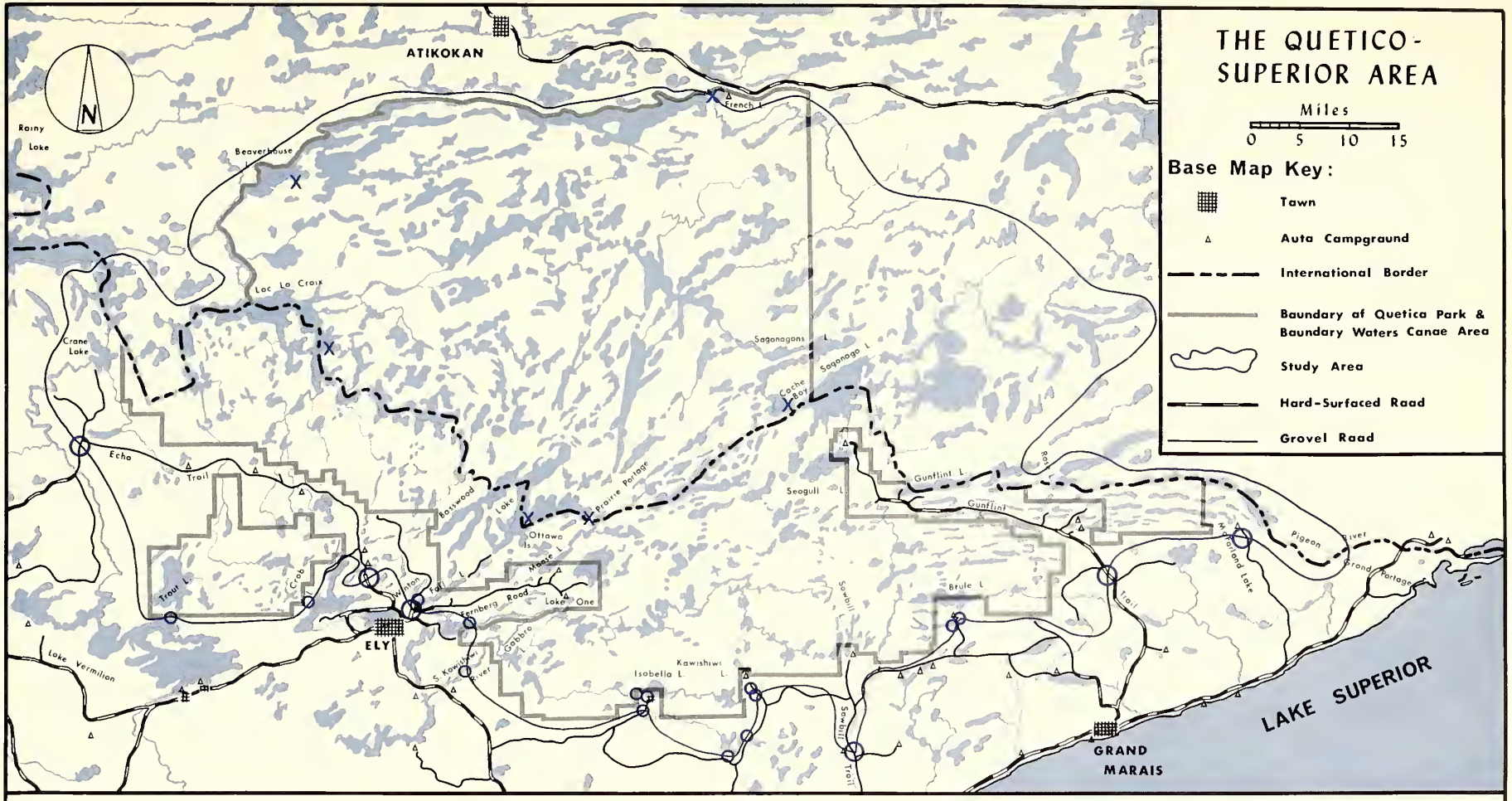
routes leading north to Quetico Park from a location with an outfitter, usually on a large lake and a major route.

Motor Canoeist Use

Of the 62 access points, motor canoeists used only 29 compared to the 34 used by paddling canoeists.

Use by motor canoeists was not quite as concentrated at Moose Lake, but 6 or 7 points accounted for almost all use. Moose Lake still led, but with 44 percent of the total instead of 52. Fall Lake was still second, but with 13 percent of all use instead of 8. Crane Lake, Lake One, and Saganaga Lake each were used by about 7 percent of the motor canoeist groups. No other point had more than 100 groups.

Moose Lake's attractions have been discussed. Again, Quetico Park was a major explanation of Moose Lake's popularity. Half of the 50 sample motor canoeists starting there went to Quetico. About 36 percent of the motor canoeists starting at all other Minnesota points went to Canada. Fall Lake, the second most used location, was also a large lake and directly accessible, had outfitters and a campground of sorts, and was on a major route which reached Canada and Quetico by two short foot portages or one 4-mile truck portage. Crane Lake was the only location used by more motor canoeists than paddlers. The lower popularity of Crane Lake with paddlers may have been due to the heavy motorboat use which would have been encountered for the first two days.



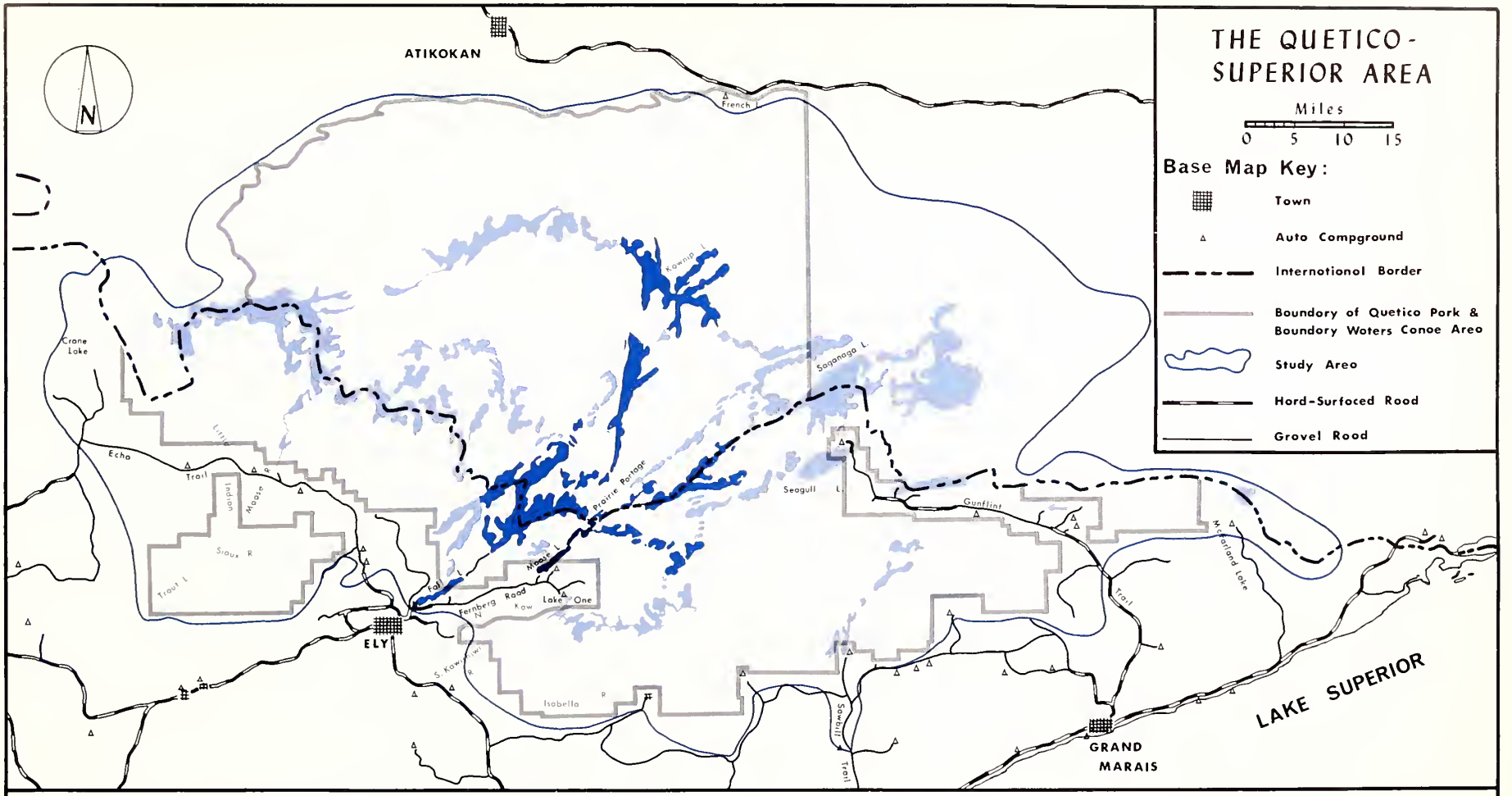
Use Checkpoint Key:

O Location of traffic counters and roadside interviews

o Location of portages and access points checked

X Quetico Park entry points

PLATE I. — The study area and use check points.



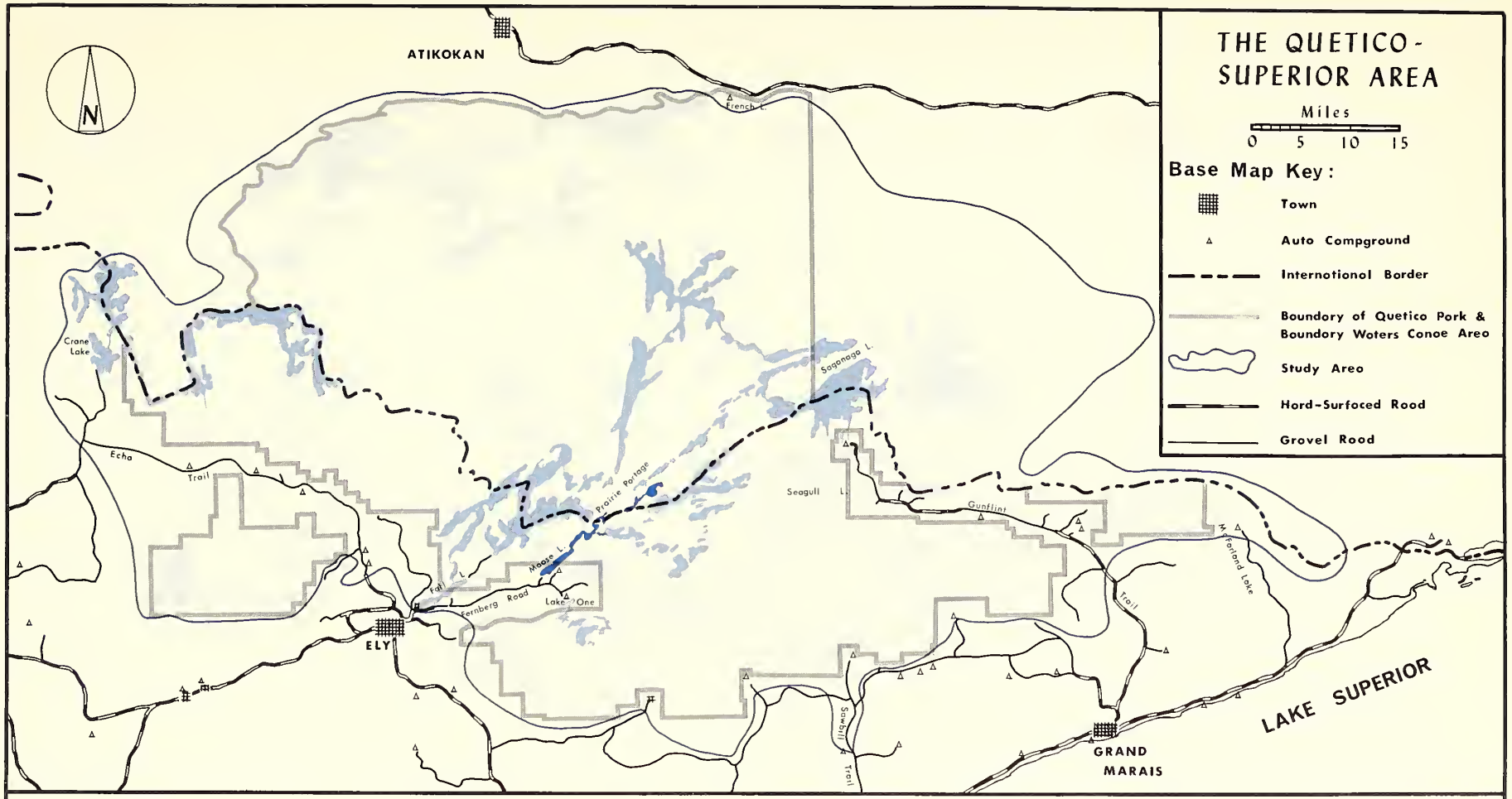
Use Distribution Key:

Estimated number of groups, June 11—September 9, 1961 (91 days). Each group was counted once on every lake visited.

1—91 (Light Use) 92—455 (Moderate) 456—2275 (Heavy) 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE II. — The distribution of paddling canoeist use.



Use Distribution Key:

Estimated number of groups, June 11—September 9, 1961 (91 days). Each group was counted once on every lake visited.

1—91 (Light Use) 92—455 (Moderate) 456—2275 (Heavy) 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE III. — The distribution of motor canoeist use.

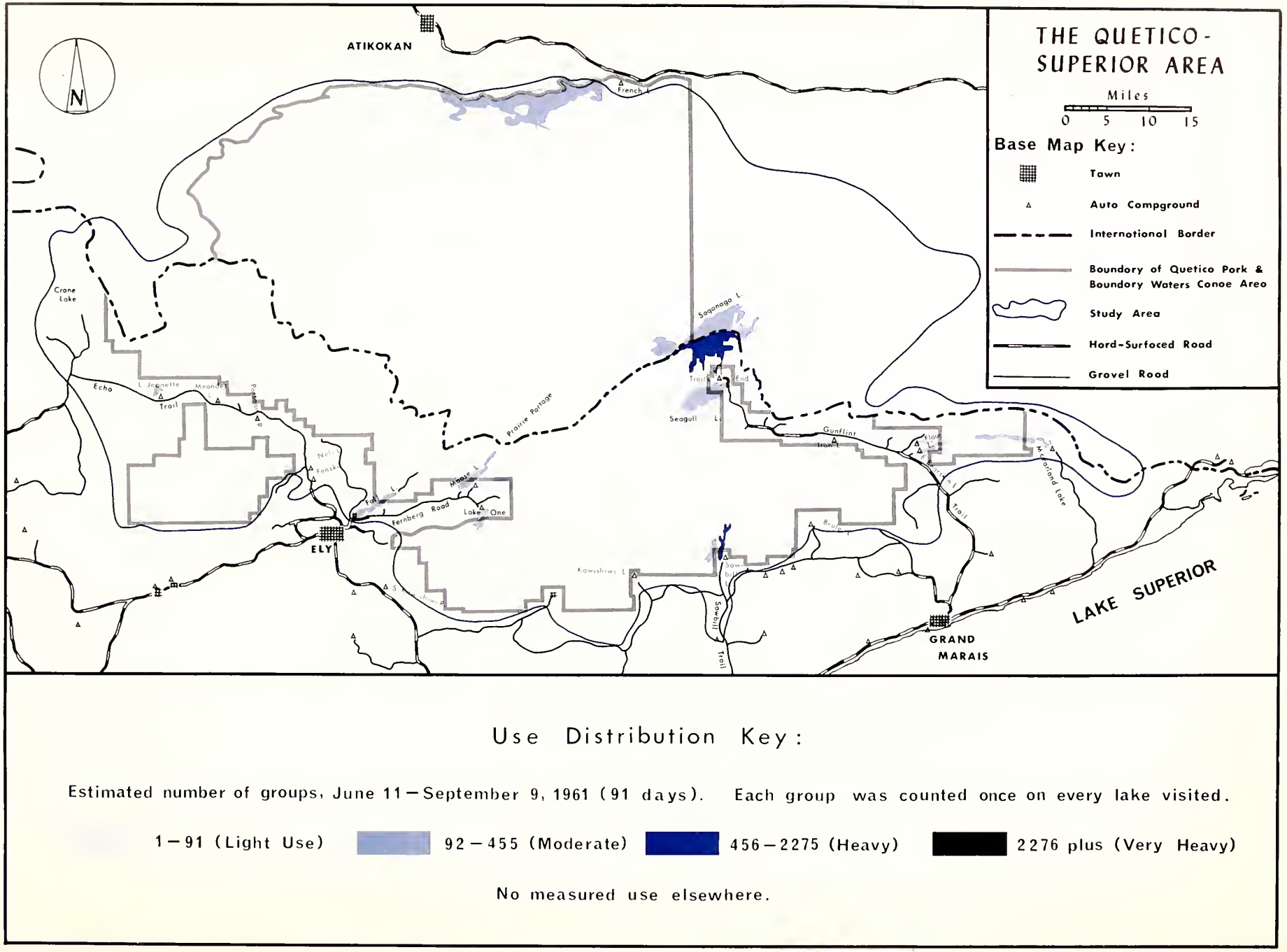


PLATE IV. — The distribution of auto camper use.

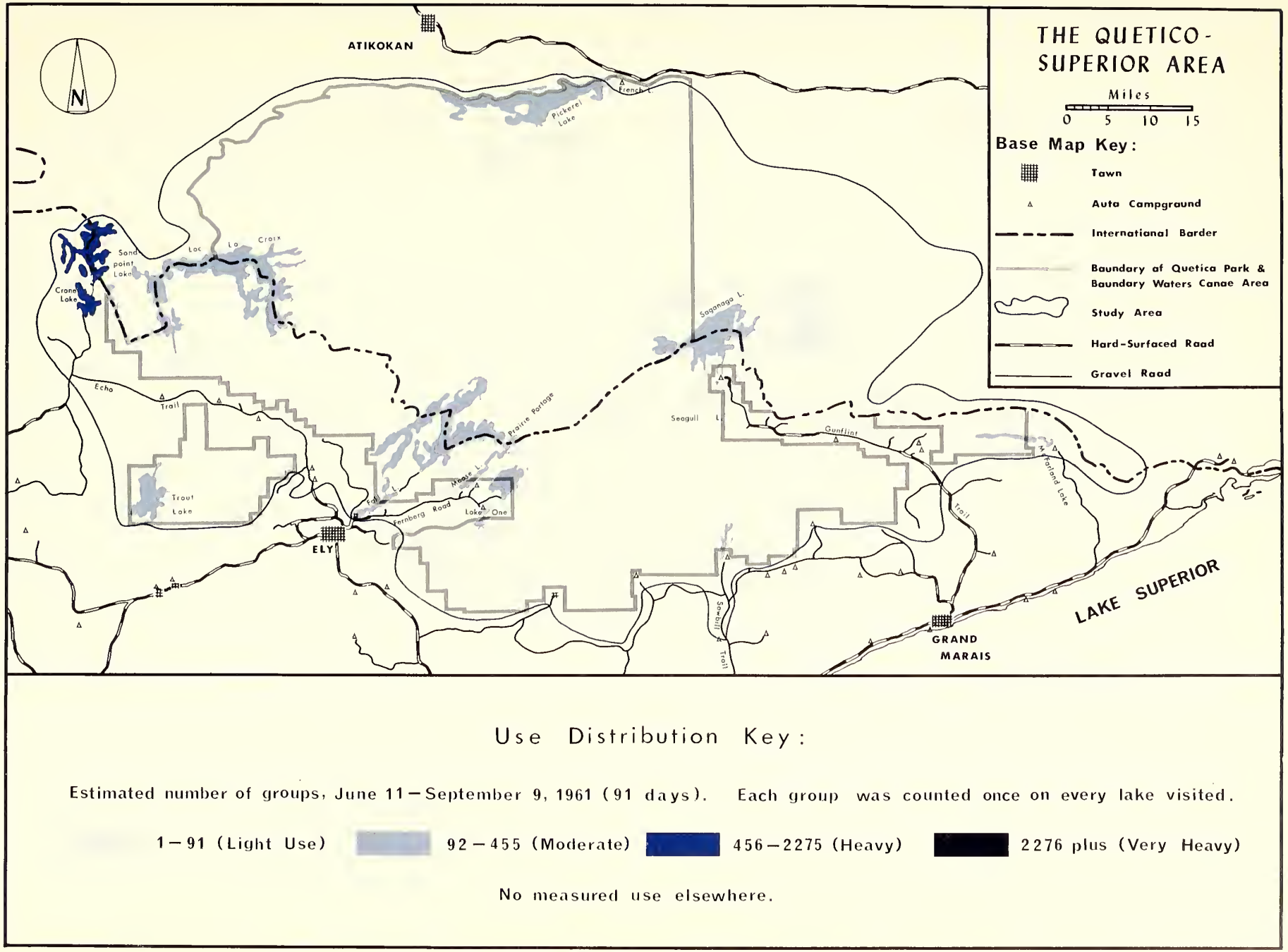
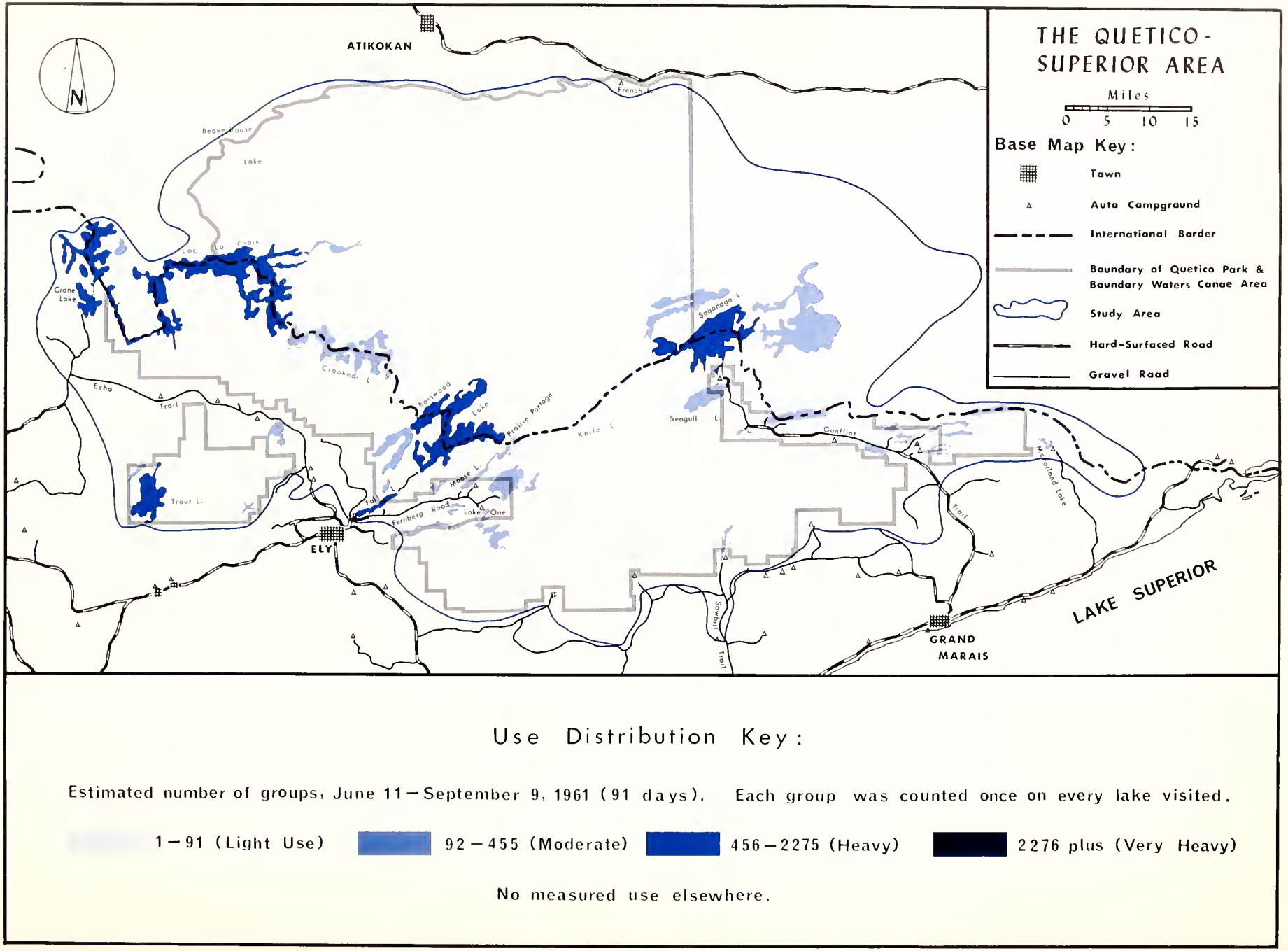


PLATE V. — The distribution of boat camper use.



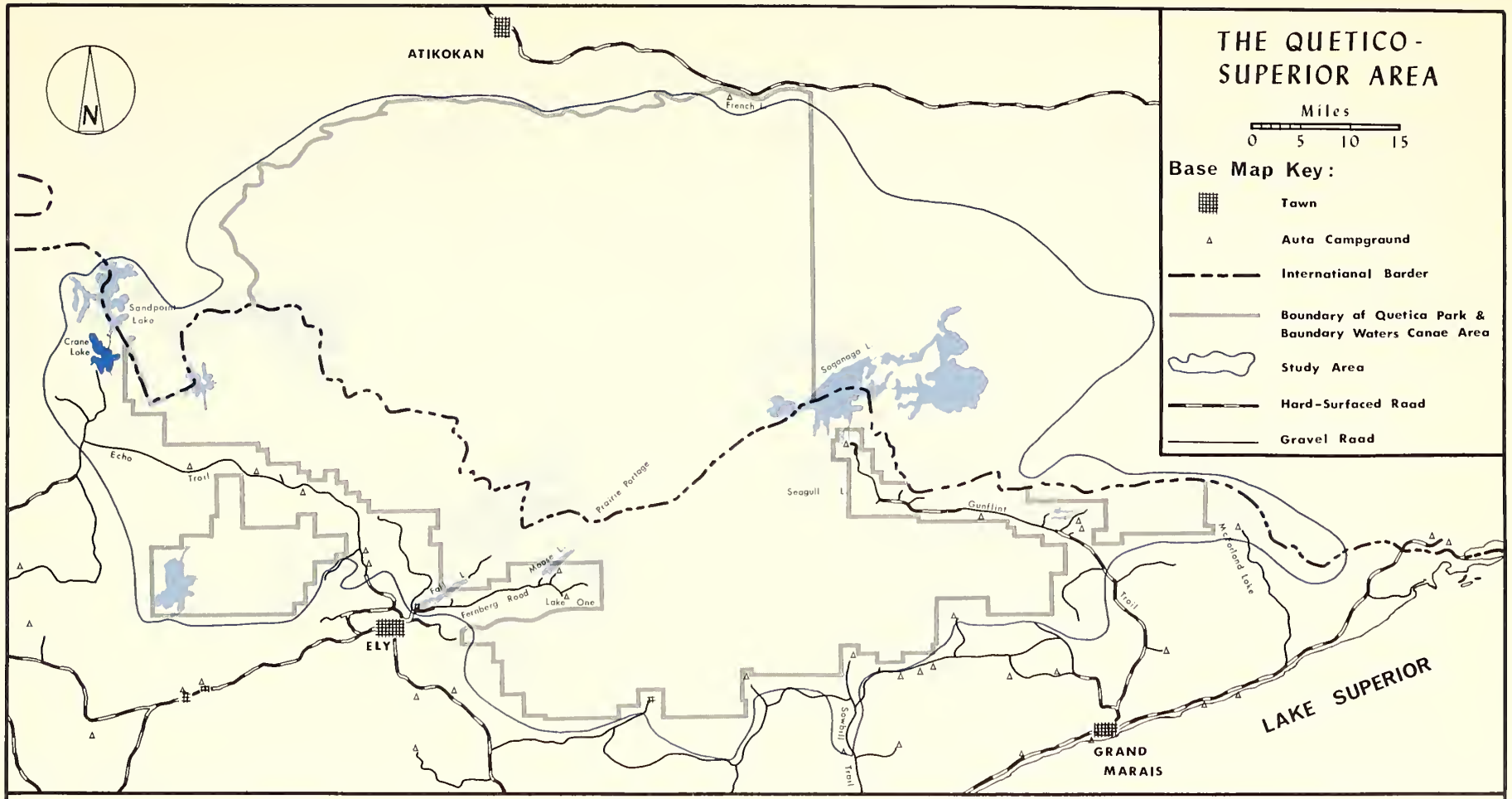
Use Distribution Key:

Estimated number of groups, June 11 – September 9, 1961 (91 days). Each group was counted once on every lake visited.

1 – 91 (Light Use) | 92 – 455 (Moderate) | 456 – 2275 (Heavy) | 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE VI. — The distribution of resort use.



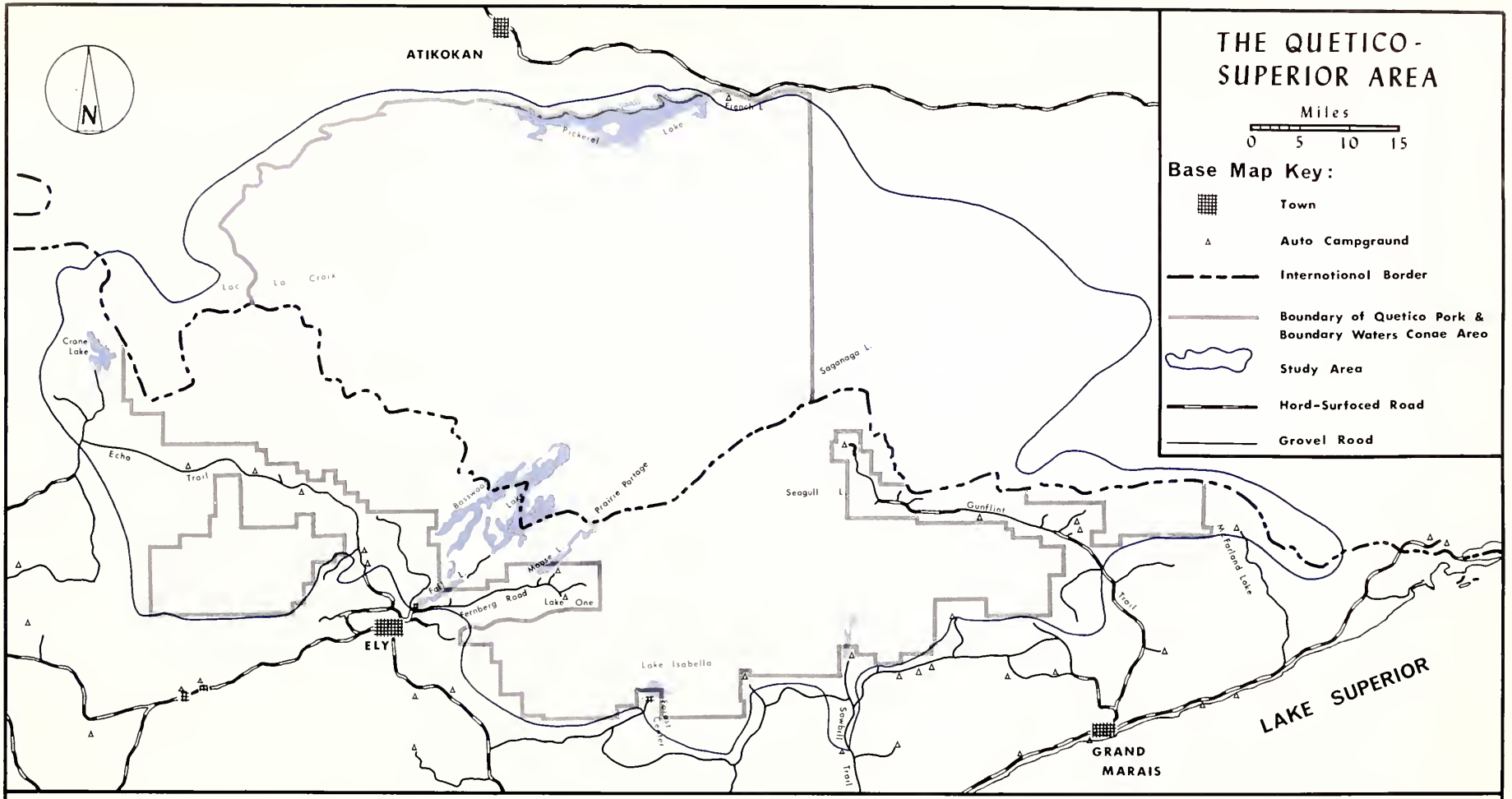
Use Distribution Key:

Estimated number of groups, June 11—September 9, 1961 (91 days). Each group was counted once on every lake visited.

1—91 (Light Use) 92—455 (Moderate) 456—2275 (Heavy) 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE VII. — The distribution of private cabin use.



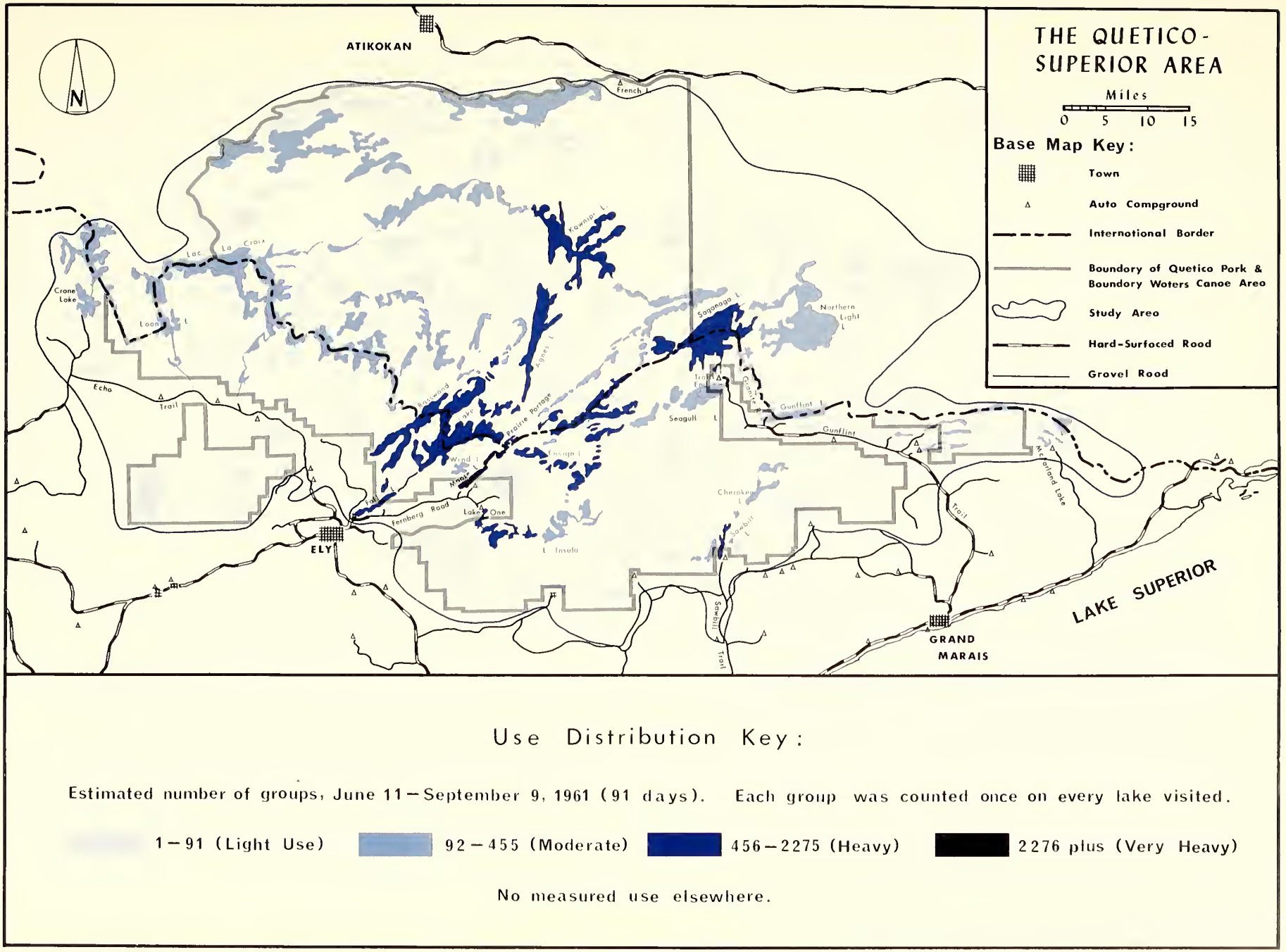
Use Distribution Key:

Estimated number of groups, June 11—September 9, 1961 (91 days). Each group was counted once on every lake visited.

1—91 (Light Use) 92—455 (Moderate) 456—2275 (Heavy) 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE VIII. — The distribution of one-day use.



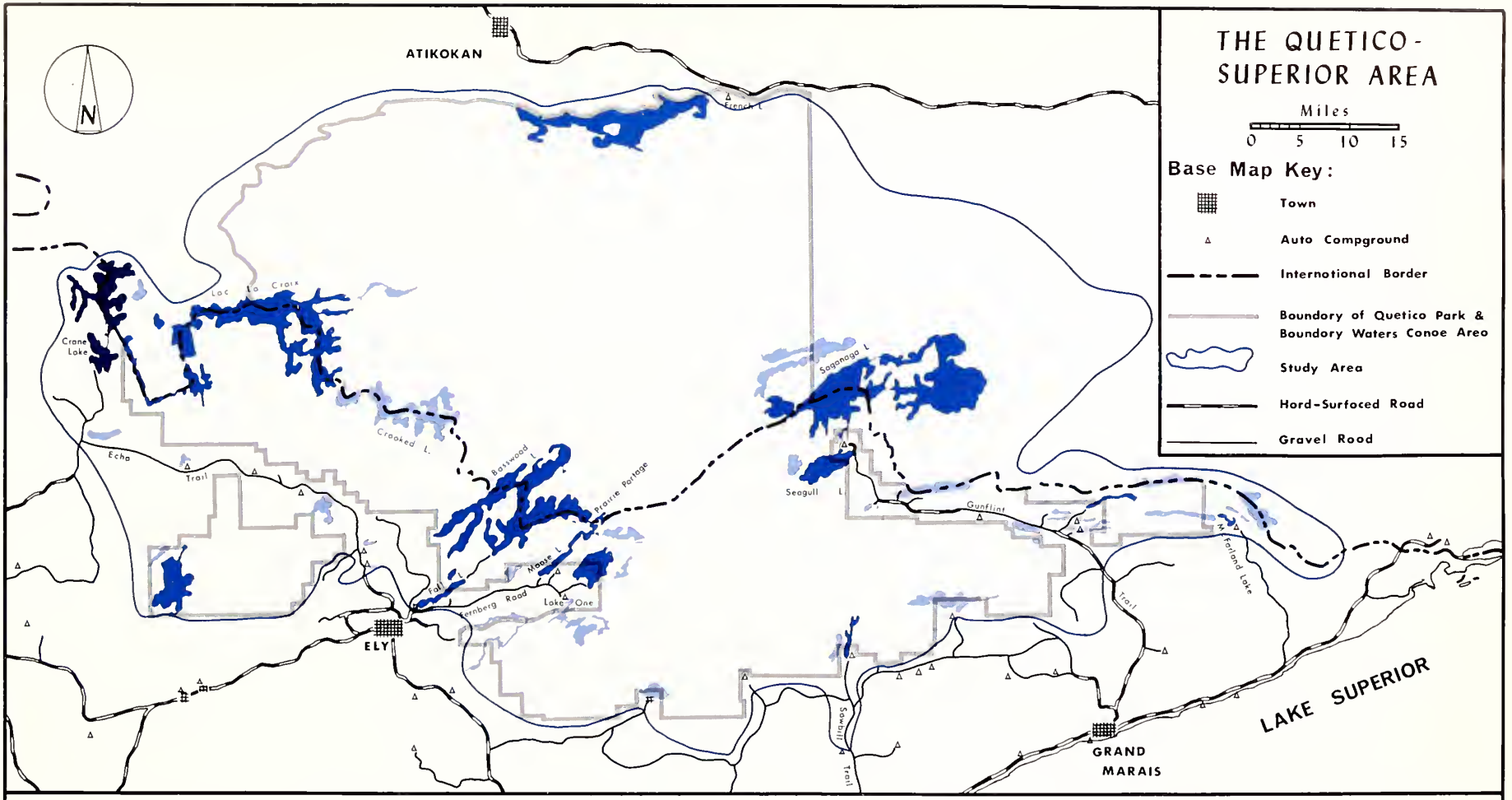
Use Distribution Key:

Estimated number of groups, June 11 – September 9, 1961 (91 days). Each group was counted once on every lake visited.

1 – 91 (Light Use) | 92 – 455 (Moderate) | 456 – 2275 (Heavy) | 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE IX. — The distribution of total canoe use.



Use Distribution Key:

Estimated number of groups, June 11 – September 9, 1961 (91 days). Each group was counted once on every lake visited.

1 – 91 (Light Use) | 92 – 455 (Moderate) | 456 – 2275 (Heavy) | 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE X. — The distribution of total motorboat use.

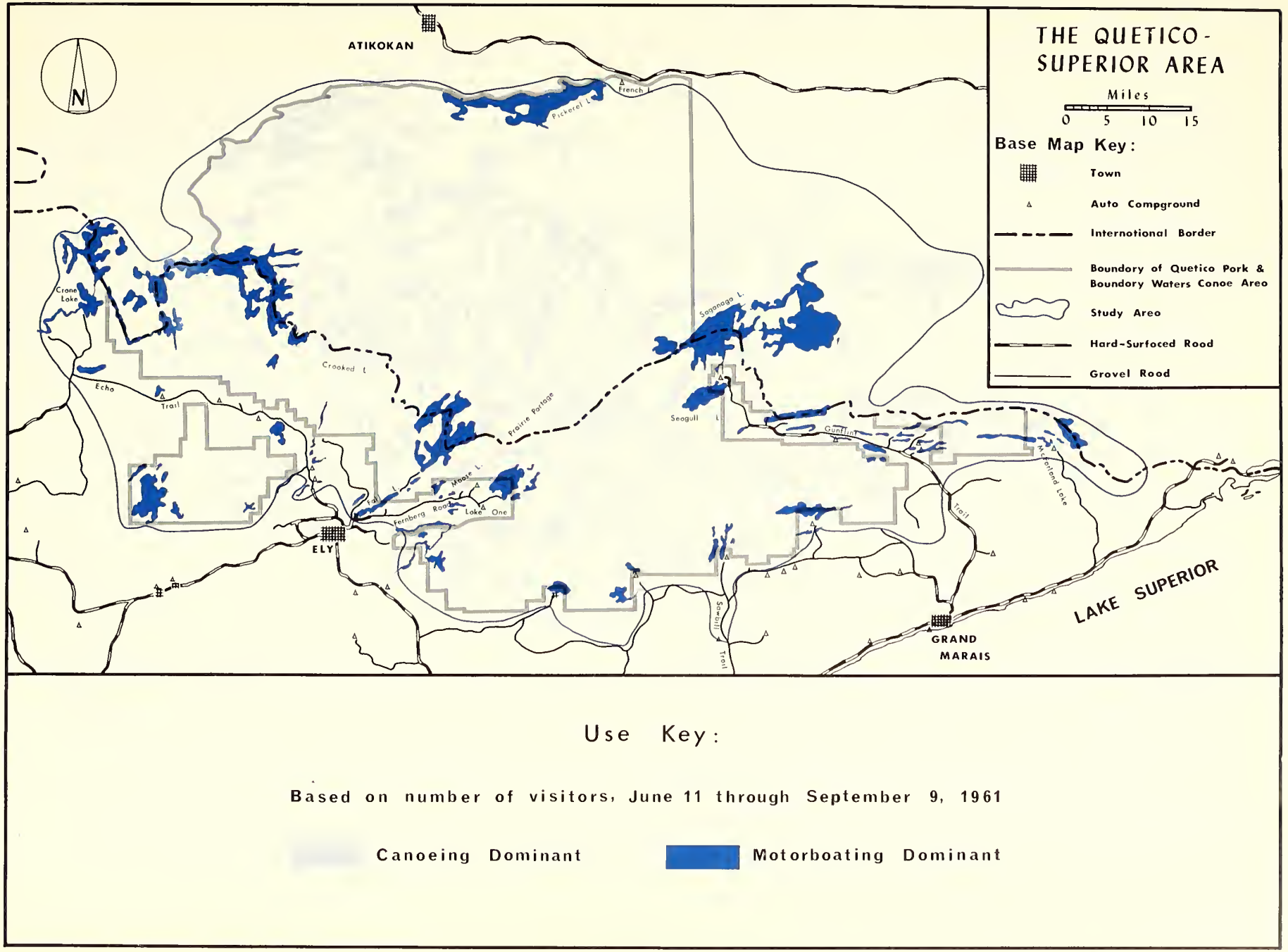
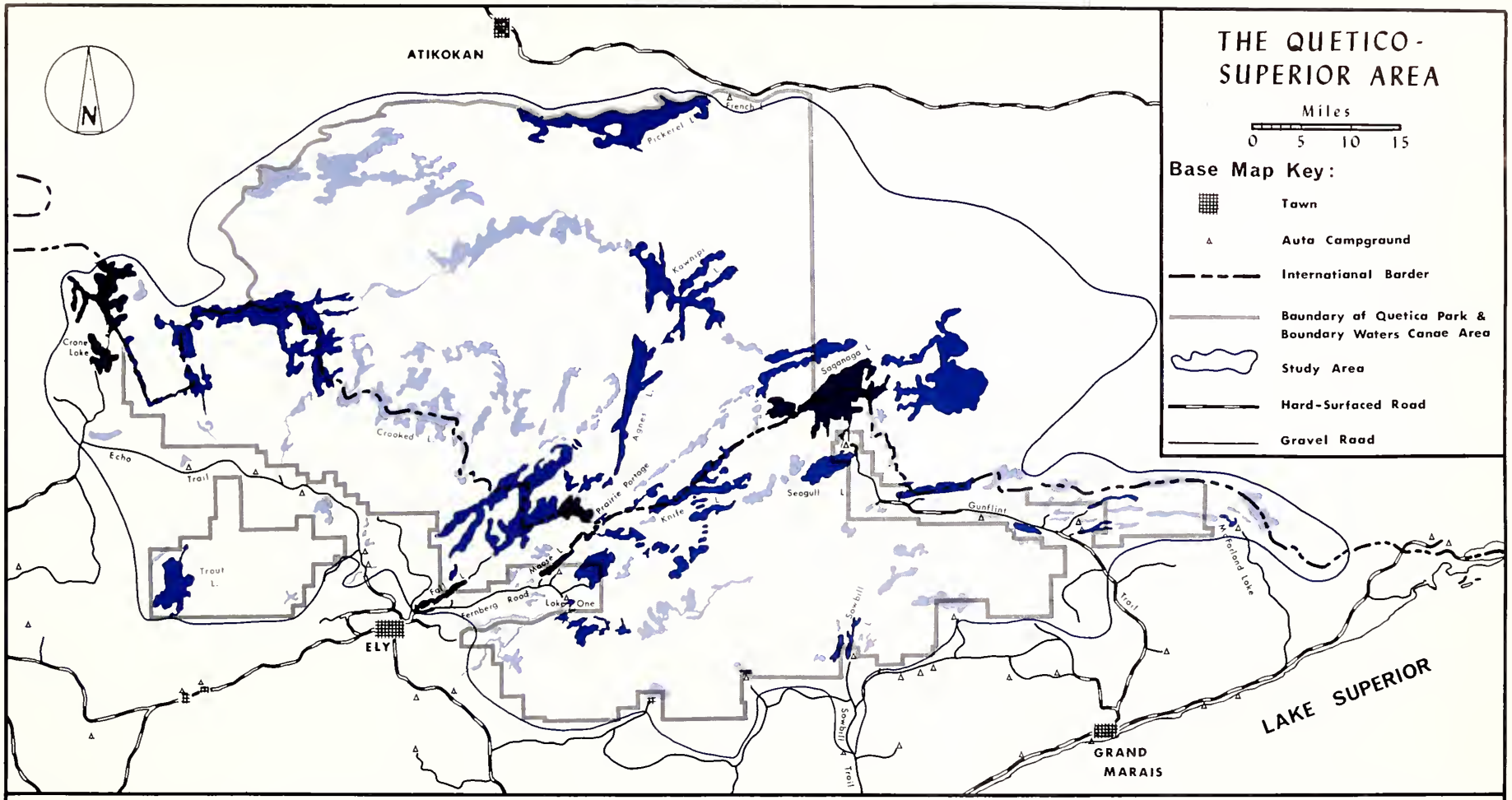


PLATE XI. — The dominant type of use (motorboating or canoeing) over the Quetico-Superior study area, 1961 study season.



Use Distribution Key:

Estimated number of groups, June 11 – September 9, 1961 (91 days). Each group was counted once on every lake visited.

1 – 91 (Light Use) | 92 – 455 (Moderate) | 456 – 2275 (Heavy) | 2276 plus (Very Heavy)

No measured use elsewhere.

PLATE XII. — The distribution of total use.

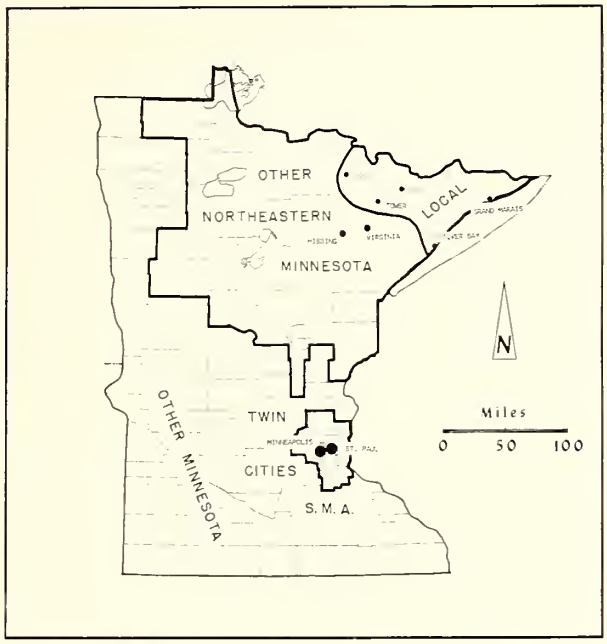


FIGURE 9. — Minnesota residence classification. "S.M.A." is Standard Metropolitan Area as defined by the 1960 Census.

Even after excluding Moose Lake, the preferences for various characteristics in starting points were fairly obvious (data were organized as in Table 5 and only the major points are presented here). Starting points within a portage of Quetico Park were used much more than other places. Easy access to Canadian areas outside the Park was less important. Presence of an outfitter was positively associated with use, but of course cause and effect are intertwined: popular spots have attracted outfitters, and outfitters have helped make places popular. In decreasing order, type of water body, location on major routes, and direct access without a portage from car to lake were associated with higher use. Other things being equal, rivers were used more than lakes, and use off the major routes was negligible.

The combined qualities again emphasize the fact that a few places with almost all of the attributes had almost all the use.

For motor canoeists, as for paddlers, minimizing driving was definitely not an important consideration and neither was minimizing travel on gravel roads.

Motor canoeists' preferences were similar to those of paddlers, except for a little more use of routes which led to Canada outside Quetico.

Auto Campground Use

Much of the large range in the use of campgrounds is explained by the variation in their capacity. Campgrounds varied in average use per developed unit (campsite) from about 7 to 45 groups (see Table 4 on p. 15), whereas total use of all campgrounds varied from 20 (at Meander Lake) to 790 (at Trail's End). About half of the campgrounds apparently were used beyond capacity, if capacity is defined as the number of officially developed sites with a parking spur, table, grate, and garbage can. Lake Jeanette was used at 218 percent of capacity, and Moose Lake 177 percent; five other campgrounds were used from 100 to 125 percent of capacity.

Some of this apparent overuse may be due to errors in the estimates, but the values do not appear inconsistent with field observations.

Use was limited by capacity at many campgrounds, and it cannot be assumed that the size of the campgrounds was closely correlated with the appeal of the locations. Because the size must be considered as given, it seems more meaningful to discuss rates—groups per campsite or family unit—rather than total use.

The first factor considered, the size of the campground, did not seem to be related to the rate of use. The hypothesis that large campgrounds would be used at a higher rate, because of a chain reaction effect in word-of-mouth advertising or because people thought the large units would not be full as often as small ones, was rejected. Data showed about average use for the

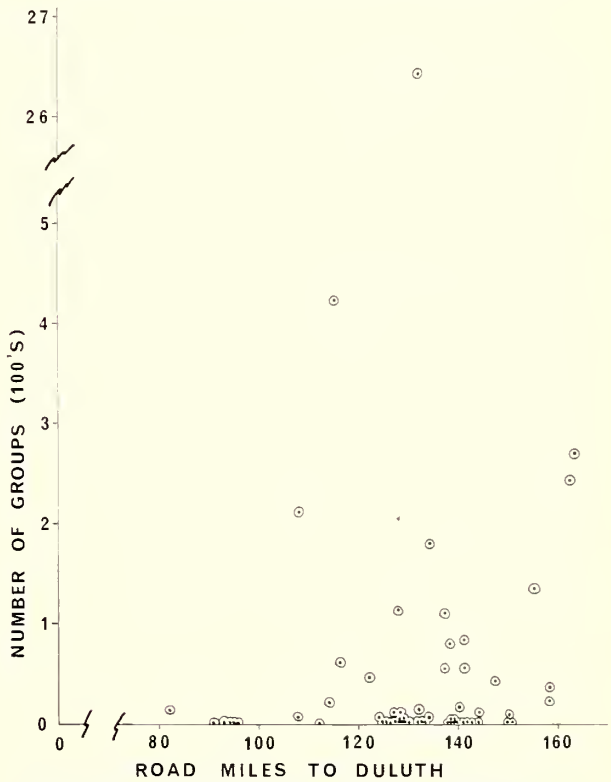


FIGURE 10. — Paddling canoeist use of access points related to road miles from the points to Duluth (for access points in Minnesota only), 1961.

two largest campgrounds and very diverse use of the small ones.

None of the locational factors investigated seemed strongly associated with use. In every case the means differed in the expected direction, but the differences were small and the ranges overlapped greatly.

Only two lakes provided direct access to Canada and Quetico Park; use was very high at one and average at the other. Large lakes were more popular. Location on major routes was also positively associated with use. Campgrounds with a water supply were apparently used more. When these four factors were combined, there was much diversity and few campgrounds in each class. Small-lake locations with a water supply were used more than any other single class. All other types of small lakes, however, were used less than any type of large lake. Drinking water may have been an important consideration for small-lake locations; but within the large-lake classes, the campgrounds without water supplies had more use than those with pumps.

Four additional factors were considered, but none seemed to help in explaining the distribution. The first factor was distance from place of residence. Well over 75 percent of the groups came from south of Duluth (Table 6). Use per campsite graphed against road mileage from Duluth showed no discernible relationship, however, and scatter was extreme. The number of miles of gravel road from the campground to a paved highway also showed no relation to use.

There was little support for the hypothesis that an isolated solitary campground tended to have a lower rate of use than a cluster of campgrounds (because of less overflow, and perhaps because of less visitor confidence in finding a place where only one campground was available.) Again, scatter was extreme, but the average rate for campgrounds within 6 miles of their nearest neighbor (by road) was 24 groups per campsite compared to 17 for those 8 to 18 miles apart. However, the two most isolated campgrounds, both apparently very popular, averaged 36. These two were both very small (only two and three campsites), and use estimates for both were based upon a sampling rate half that of almost all of the other campgrounds.

Finally, the campgrounds were grouped by roads. The ranges of use overlapped greatly (Table 7). The only campground on the McFarland Road had the highest average—37 groups per campsite. The Fernberg Road was next most popular, and this, of course, was due to Moose Lake, as Lake One was about average. The Gunflint Trail had by far the greatest total use, and all of its campgrounds were used substantially. On the Echo Trail, Lake Jeanette, the campground

TABLE 7. — *Amount and rate of campground use by major roads, June 11 through Sept. 9, 1961*[1]

Road	Number of campgrounds	Total groups	Groups per campsite	
			Average	Range of averages
Echo Trail	4	530	18	7-45
Fernberg	2	370	33	20-45
Sawbill Trail	3	660	21	10-35
Gunflint Trail	4	1,310	22	17-28
McFarland	1	110	37	-

1/ Data taken from roadside interviews. Nels and Fall Lakes were omitted because neither had developed camping units.

nearest Crane Lake, compensated for three campgrounds with below-average use. The Sawbill area varied from high to low.

In summary, campground use did not seem to be very predictable on the basis of campground characteristics. There are at least four possible reasons for the uncertainty which surrounds almost every hypothesis examined. One, the data may be inaccurate. This is most serious for the small, lightly used campgrounds because of small samples. It seems questionable, however, whether even a fairly large random error or an over-all bias (and there is no reason to believe a bias exists *between* estimates for different campgrounds) would so obscure any strong relationships. Second, the factors investigated may not be the right ones. Perhaps a reputation as a good fishing lake was more important, but this information was lacking. Third, most of the hypotheses rest upon an assumption that people desired to minimize cost or effort and preferred improvements—or possibly upon just the reverse, that they desired to maximize cost or effort by going to the end of the road or getting away from improvements. If people here had behaved fairly consistently in either of these ways use would have been more predictable. However, these two forms of behavior were apparently very mixed; some people wanted to rough it in the most isolated campground, and others did not. A later publication will show how conflicting were the attitudes of visitors in general, particularly for auto campers. A fourth major reason is that many people did not really make a choice, either because they were unaware of alternatives or because their first-choice campground was already full.

Boat Camping Use

Of the 64 possible access points,[8] 36 were used by sample boat camping groups. These 64 points averaged

[8] *Two more than for canoeists. Several lakes with no portages to waters beyond and therefore not on canoe routes are included, and small rivers not usable by boats are excluded.*

58 groups; but the variation was great. Excluding unused points, use ranged from 2 to over 900 groups and averaged 102 groups.

The most highly related single factor was location accessible to Canada without a portage. Quetico Park entry points seemed less important than Canadian water in general, mainly because of Crane Lake's great popularity for boating. Almost 90 percent of the Crane Lake boat campers went to Canada, but less than half went east over the rail portages to Lac La Croix, part of which is in Quetico Park. Next most related was type of waterbody, followed by location on a major route, and then by direct access from car to lake.

The grouped factors suggest that border location was overwhelmingly important. All other types of locations had much less use, except Trout Lake, an 8-mile-long lake in the southern part of the Boundary Waters Canoe Area, where a truck hauled in large numbers of boat campers. Although use at locations away from the border was low, the progression between classes of locations was quite regular; additional favorable factors were usually associated with more use.

Additional driving distance clearly was not associated with declining boat camper use. This also held for distance over gravel roads.

Resort Use

Resort use can probably be analyzed better in terms of absolute numbers of groups rather than as an average per resort or per cabin. First there was more excess capacity (Sielaff 1959, Table 17 and pp. 14-16; and personal observation) so that an upper limit on use had less meaning than in campground use. Second, the supply presumably has tended to increase where demand has been greatest,[9] because resort services are marketed for profit. Only rough estimates of resort capacity were available, but the proportion of capacity utilized apparently varied less from lake to lake than did that for campgrounds. Differences in rate of utilization as related to resort quality tended to even out between lakes because most lakes had a number of establishments. Lakes without resorts were excluded as it was almost impossible to determine which ones could not have resorts because of a combination of landownership and policies (public and private). The last argument also holds for private cabins.

Resorts on water routes without a portage to Quetico Park entry points had the greatest use. Next were resorts with direct routes to any Canadian waters. Resorts on large lakes had considerably more use than those on small ones. So did resorts on major routes compared to those not on major routes.

The combined factors tended to support the conclusion that these four qualities were related to use.

In general then, the distribution of resort use seemed more predictable than that of campground use. Resort guests seemed more homogeneous in their decisions and agreed better as to what sorts of resort locations were preferable—large lakes, lakes with good opportunities to go back another lake or two, and direct water routes to Canada, especially to Quetico Park. The most desirable lakes in these terms often required more driving, and more travel on gravel roads, both of which the resort guests did, either as a price they were willing to pay or because going to the end of the road had intrinsic appeal around a roadless area.

Private Cabin Use

Again, total use of cabins seems particularly appropriate for analysis because most individuals have chosen the cabin's location, not selected from a limited number of existing locations, such as campgrounds. However, because 73 cabins inside the Boundary Waters Canoe Area have been eliminated through purchase, and the remaining cabins cannot expand capacity as the comparable resorts have, the analysis is limited to cabins on lakes at least partly outside the Canoe Area.

When characteristics were grouped, the over-all relationships were less clear than for resort guests. The greatest use was on the large lakes on major routes to Canada, regardless of whether or not to Quetico Park. Next came large lakes on major routes. Other large lakes did not seem to be preferred over small lakes.

Cabin use as related to remoteness showed much scatter with perhaps a weak tendency for use to *rise* with increasing distance. Miles of gravel road in relation to use showed even more scatter and no trend.

One-Day Use

One-day use occurred at 28 locations, which averaged 72 groups each. The distribution was more even than the distributions for other types of lake use.

[9] *This applies to the fringe area outside the Boundary Waters Canoe Area, not within it where public policy has curtailed the supply of resort accommodations. However, the three lakes completely inside the Boundary Waters Canoe Area with bona fide resorts (Lac La Croix, Crooked Lake, and Basswood Lake) still averaged over 400 groups compared to an over-all average of 230, and they are included in the analysis. By early 1963, 33 resorts had been removed, mainly from Basswood Lake. Total use was probably even higher before, although the remaining resorts have enlarged and probably enjoy a higher rate of use in their present semi-monopolistic situation.*

Of these groups, 44 percent were made up of people living in the local area; 30 percent more lived nearby in other northeastern Minnesota areas (see Table 6 and Fig. 9). The proximity of local population seemed to be the main factor associated with the distribution of 1-day use. Fall lake, 5 or 10 minutes from Ely, had the most 1-day use, about 350 groups. Forest Center, a small logging settlement, is located almost on the shores of Lake Isabella where residents kept boats on the beach, and something over 250 groups are estimated to have used the lake. Pickerel Lake, near the mining town of Atikokan, Ontario, was next. Crane Lake, accessible to the settlements on the Mesabi Iron Range, followed closely. Locations farther east, especially on the Gunflint Trail, where local populations were small and distant, had very little 1-day use. This was also true of places near the end of the Fernberg Road or along the Echo Trail. Although it is difficult to measure relative remoteness objectively for 1-day use, because of the spread of residence of these people, apparently parties with only one day to spend tried to spend as much of it on the lakes as possible.

Places requiring a portage to a lake or river had only about 5 percent of all 1-day use, most likely because this use was essentially all boat use, and hauling a boat over a portage for an afternoon's fishing was viewed as a poor bargain.

Large lakes were much more popular. Location relative to Canada had little or no association with use.

Summary of Factors Related to Use of Starting Points

To summarize, there seemed to be four types of distributional associations. Canoeists were most predictable; starting points on large lakes leading to Quetico Park were most attractive to them. Canoeists also used access points requiring a portage from car to water more than did boaters. Auto camping was not strongly related to the locational characteristics investigated. The preferences of the other types of visitors were similar and fairly predictable; heaviest use for these types (primarily boaters) was on large lakes with starting points directly on waters leading to the Canadian border. Day use was mainly associated with accessibility to local populations.

Factors Related to Use of Water Routes

In this section the rate of decline in use of routes, as portages became more and more numerous and more difficult, is discussed first. Then, some factors related to popularity of some particular routes are considered.

The relationships are very different for boaters than for canoeists. There was some difference between canoeists who paddled and those using outboard motors.

Canoe Use[10]

Portages were related much less to canoe use than to boat use. About 95 percent of the canoeists portaged at least once, but a single unmechanized portage stopped about 80 percent of the motorboaters (Fig. 11).

The youth camp groups portaged much more than other paddlers. The curve for a small sample of Boy Scouts is horizontal for most of the range shown on the graph; this was typical of all of the camps. Camp groups were a small part of total use, but they spread a veneer of use over almost all of the more remote lakes. The amount of use by other paddlers declined regularly and gradually, almost in a straight line. Over 50 percent of all of the paddling groups crossed at least 5 portages before they turned back toward their starting point. Motorized canoe use still differed considerably from paddling use (even excluding camp use); 8 portages away from the starting point 30 percent of the paddlers but only 13 percent of the canoeists with motors were still around.

Four factors seemed to account for the paddlers' greater range. First, although a motor permitted faster travel over water, more paraphernalia was required—motors weighing 20 to 40 pounds and heavy gas cans—which made portages more of a chore. The slower water travel by the paddlers did not significantly limit their range, given the scale of the study area. Enthusiasts could paddle clear across it anywhere in less than a week. A second reason lay in the different motivations of the two groups. The paddlers looked upon the canoe travel itself as a major objective, and cruised widely for its own sake, to explore the country, and to get away from other people. More of the motor canoeists were interested primarily in fishing, and considered canoe travel as a means to get quickly to a good place to fish; they had no strong desire to go beyond a lake which they thought was not "fished out." A third factor, probably related to motivation, was that motor canoeists tended to be older. Only 42 percent were under 20 compared to 64 percent of the paddlers, and 21 percent were 35 or older compared to 16 percent of the paddlers. Fourthly, the average paddling canoe group (omitting youth camp groups) stayed longer: 7.1 days compared to 5.7 days for motor canoeists. Youth camp groups stayed longer yet, 8.6 days.

[10] *Canoeing incidental to auto camping, and so on, is excluded.*

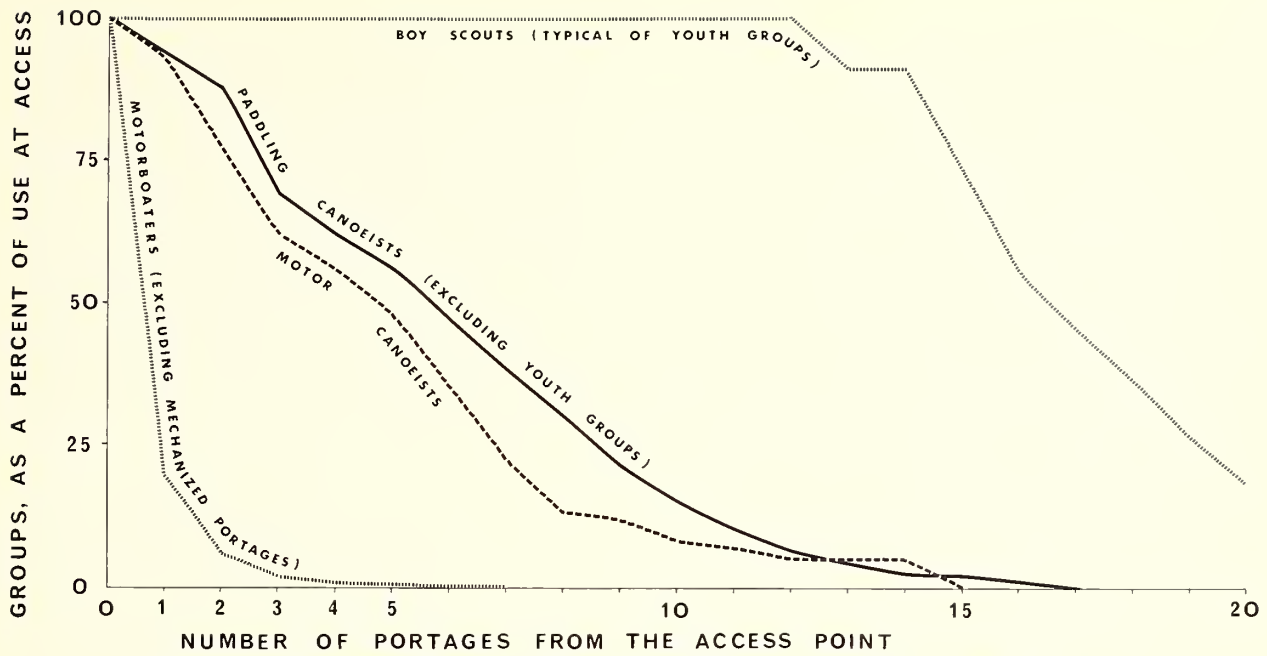


FIGURE 11. — The amount of selected types of use related to the number of portages from the access point to the location, 1960 and 1961.

Portages apparently had a different meaning for canoeists than for boaters. Boaters, as is discussed in the following section, seemed to consider lakes as a goal and portages as a cost. The situation was very different for canoeists, especially for the paddlers. They seldom had a definite lake as a goal, and portages were just another part of the experience. It is not appropriate, therefore, to interpret Figure 11 primarily as the result of a filtering-out process due to portages. The curve declines with increasing portages more because people ran out of time and turned back than because portaging was such a burden. This means that distance from an access point was more highly related to canoe use than was number of portages. If this is true, the maps of canoe use should be more nearly concentric around accesses than is the boat use map. Although there are exceptions, the canoe use maps *are* reasonably concentric in this way, and much more so than the boat maps. This is another case where technological advances in transportation apparently narrowed the choice of ways.

The decline in canoeist use away from access points is best described by the map, Plate IX. It integrates the effect of the number and difficulty of portages, size of lakes, frequency of distributary routes, and overlapping of routes as they actually occur in unique combinations over the area. This seems to be the research tool that would aid an administrator most in deciding how many canoeists he should allow to enter at an existing access point if he felt that use on certain interior lakes should be limited to some particular level. Although boat use is much simpler in pattern, that map (Plate X) is also the most accurate guide for administrative decisions. However, the relation of portages to use (Fig. 11) helps in predicting the consequences of any additional access.

Mechanized portages had little significance for canoeists. The most heavily used portages were not mechanized, and even where such aids existed, as between Loon Lake and Lac La Croix, many canoeists carried around them anyway.

Length of portages had some relation to use, more for motor canoeists than for paddlers (Table 8). Motor canoeists were similar to boaters in percentage of portages used. The average numbers using longer portages declined more for canoeists than for boaters, but the practice of boat storage (discussed below) was probably the explanation.

What factors help explain the choices of routes shown on the canoeist maps? For both types of canoeists, outfitter's advice was the main reason cited (Table 9). Between 25 and 30 percent of the canoeist groups had no previous experience in the area, and almost all of those gave this reason. Professional guides played a very minor role. Except for the groups from young people's camps, none of the sample paddling canoeists used guides, and less than 10 percent of the motor canoeists hired a guide.

Word-of-mouth advertising was important for both groups, and so was previous experience. Scenery was not often cited as decisive. Easy routes and good fish-

TABLE 8. — *Use of portages[1] related to portage length for three user types*

Item	Length of portages		
	1/4 mile or less	Between 1/4 & 1/2 mile	Over 1/2 mile
Percent of portages used by:			
Paddling canoeists	89	89	67
Motor canoeists	42	68	33
Motorboaters[2]	49	45	30
Average number[3] of groups using portages for:			
Paddling canoeists	119	79	35
Motor canoeists	82	28	36
Motorboaters[2]	105	95	51

1/ The first portages on each route were taken as representative.
2/ Unmechanized portages only.
3/ Average for portages that were used; unused portages omitted.

TABLE 9. — *Frequency of various reasons for choice of route cited by canoeists*[1]

Reason for choice of route	Percent of total	
	Paddlers (64 groups)	Motorized (21 groups)
Recommended by an outfitter or guide	39	43
Recommended by a friend or acquaintance	25	19
Have started here before, know the route	22	24
More attractive scenery than other routes	3	5
Fewer or shorter portages than other routes	5	14
Better fishing than other routes	5	14
Easy way to get to Canada	0	0
Meet fewer people here than on other routes	17	5
Have not gone this way before, something new	11	19
Other	11	5
None, don't know	0	0

1/ Data from long interviews. Percentages add to more than 100 because many groups cited more than one reason.

ing were cited three times more often by motorized canoeists than by paddlers, which was consistent with other findings. In contrast, lack of crowds was much more important to paddlers, and again this conformed to other data. Novelty of a new route was also commonly mentioned, especially by motor canoeists. None of the canoeists said they did not know why they had chosen their route.

When asked specifically about Canada, no canoeists listed it as a factor in choice of route. This was surprising in view of earlier conclusions. Perhaps the question was faulty, or again, canoeists may have gone to Canada to enjoy qualities they thought it had, rather than because it was Canada. When asked why they had gone to Canada, most canoeists were vague. Over half of the paddlers said, "We always go to Canada," or, "To say we'd been there," and one third could give no reason. Fifteen percent said they chose Canada because it was wilder, and 7 percent said because fishing was better. The motorized canoeists were clearer: half said they went to Canada because they thought the fishing was better.

Generally, canoeists visiting Canada discovered few differences from the U. S. side. Two thirds found no differences, and 10 to 15 percent said Canada was wilder or had "bigger trees," fewer motorboats, or fewer users.

The Canadian border seems to have had little effect as a barrier. Most of the canoeists on the border lakes crossed into Canada. The border seemed to attract rather than repel; only about 17 percent of all canoe groups that avoided Canada said they did so because of expense or regulations.

The physical pattern of the lakes was also related to use. For example, the route from Lake One east had no side routes of any magnitude until after Lake Insula, and use declined little even after six portages. In contrast, from Moose Lake three major routes diverged near Prairie Portage, and a fourth secondary route went through Wind Lake; as a result, the stream of canoeists spread out faster and use on each route declined fairly fast.

Apparently routes to the north tended to be favored, especially by paddlers. From Saganaga more groups headed north to Kawnipi than southwest on the border or east to Northern Light Lake. From Gunflint Lake more canoed north on the Granite River than east on the border. From Moose Lake the least used route (after the Wind Lake short cut to Basswood) was the route to the east through Ensign Lake. Even at Sawbill Lake, remote from Canada, the most used of three main routes was north to Cherokee Lake.

Boat Use

As pointed out previously, most motorboaters used the portages and water routes in very much the same ways whether they were staying at resorts, cabins, campgrounds, or camping out on the lakes. This similarity was due to two things primarily: the restricted mobility of boats, and similar motivations for all those using boats, regardless of visitor type. Because of this

similarity, total motorboat use (Plate X) is analyzed rather than the maps of each type of use.

The amount of use was related more to number of portages[11] than to distance from access points. Within the study area 33 lakes and 3 rivers usable by boats could be reached directly by car, and 6 more lakes could be reached by boat without a portage. All but three of these locations were used by people in motorboats during the study period, with an average of 520 groups on each. Unmechanized portages reduced use greatly, however (Fig. 11). Only about 45 percent of the lakes that conceivably could have been reached by one foot portage were used, and an average of only 90 groups used such lakes.

Many of the unmechanized portages still did not require carrying or dragging a boat over the trail. Resorts in particular stored boats over many (probably more than half) of the portages, sometimes as far as two or three portages back, which greatly reduced the significance of portage.

Where portages were mechanized, use declined much less: in fact, the 6 lakes reached by one mechanized portage had almost as many total visitors as all 54 lakes reached by one unmechanized portage. These six lakes averaged 680 groups each, which is more than the average of directly accessible lakes. Most of the six were large, desirable lakes, or a step along the way to such lakes. Mechanization apparently seemed worthwhile only for these large lakes. Lac La Croix was reached by two mechanized portages, and over 1,000 motorboating groups visited it. The resort on Crooked Lake used jeeps on two portages beyond La Croix, and an estimated 125 groups stayed at this resort. Boats were not hauled for the general public on these last two portages, however.

Since the amount of boat use was more a function of number and type of portages than of distance, the decline in the amount of use away from access points was not even roughly concentric. The size and shape of the lakes resulted in axes, or fingers, along which use declined slowly and by steps. This describes use on routes originating at Crane Lake, Fall Lake, Moose Lake, and Saganaga, for example, where there were long, large lakes separated by only one or two portages. In other directions, where more portages were encountered sooner and lakes were smaller and less appealing to boaters, use decreased abruptly. Examples are routes reaching south and west of the Gunflint Trail, and on either side of the Echo Trail.

The eastern slate area, on the other hand, was almost all used by motorboats, because of the ready-made routes provided by the elongated parallel lakes.

The Canadian border, with the drawbacks of customs declarations, a duty on food (except on Basswood Lake), $5 boat and canoe tags, travel permits, and nonresident fishing licenses, did not seem to deflect motorboat routes. On the four major international lakes where border control was maintained, 74 percent of the interviewed groups said they had entered Canada. This was consistent with the strong attraction of Canada revealed previously.

Examination of Table 10, showing reasons for choice of route, indicates that not much choice was exercised.[12] This aimlessness has a bearing on policy implications, which will be taken up in a later paper. The most frequent response for all groups except the boat campers was "no reason" or "don't know." In sharp contrast, canoeists never reported "no reason." Recommendations of outfitters, resort operators, and guides were insignificant except for resort guests (about 40 percent of the resort guests used guides—nobody else did). Information from friends had some effect, particularly for auto campers. Familiarity was cited by almost three fourths of the boat campers, and many of the others. Scenery was mentioned fairly often. Easy portages were cited only by boat campers and private cabin users, which is probably at least partly due to the resorts' practice of storing boats for their customers' use. Fishing was a major factor in decision making for all except auto campers. Lack of people was minor but most important to boat campers, as would be expected.

Canada was rarely mentioned directly despite its strong apparent relation to use. Those who went to Canada were asked why they had, and over half (57 percent) said they had no reason, it was just "something to do." Good fishing was cited by 39 percent.

Again, it is interesting to compare people's experience in Canada to their expectations. No difference was detected by 71 percent of these people and differences such as bigger trees in Canada, better scenery, wilder country, and more fish were each reported by only 3 to 10 percent of the groups.

Inspection of Plate X does not suggest a strong tendency to prefer travel towards the "romantic, wild north," although the few natural motorboat routes on large lakes leading south provided little basis for judgment. Where the degree of difficulty and the character

[11] *Portages could not be shown on the small-scale use maps. The large-scale Fisher maps cited are the best source of portage information for the entire area.*

[12] *Professor Philip M. Raup of the Department of Agricultural Economics, University of Minnesota, has pointed out the similarity to "impulse buying."*

TABLE 10. — *Frequency of various reasons cited for choice of route by users other than canoeists*[1]

Reason for choice of route	Percent of total groups			
	Auto campers (96 groups)	Boat campers (24 groups)	Resort guests (57 groups)	Private cabin users (21 groups)
Recommended by an outfitter or guide	6	0	18	0
Recommended by a friend or acquaintance	27	5	13	0
Have started here before, know the route	18	71	36	42
More attractive scenery than other routes	3	14	8	16
Fewer or shorter portages than other routes	0	14	0	8
Better fishing than other routes	3	24	26	33
Easy way to get to Canada	0	5	3	0
Met fewer people here than on other routes	3	14	5	8
Have not gone this way before, something new	3	0	13	0
Other	18	19	8	33
None, don't know	27	14	38	42

1/ Data from long interviews. Percentages add to more than 100 because many groups cited more than one reason.

of the lake at the destination were similar, boaters seemed to go one direction about as willingly as another.

Summary of Factors Related to Use of Water Routes

In summary, the type of craft and kind of power were the deciding factors for the use of routes by all classes of visitors. Boaters used mechanized portages heavily, but used other portages lightly. Paddlers, especially from young people's camps, ranged most widely. Putting a motor on a canoe seemed to be associated with a somewhat narrower range, and the length of portages had the greatest depressing effect on amount of use. For boaters, portages affected use more than distance over waterways, but the opposite was true of canoeists.

TRENDS IN RECREATIONAL USE

There has been much interest the last few years in assessing past trends in amounts of outdoor recreation activity and in projecting these trends into the future (Clawson and others 1960; U. S. Forest Service 1959; Outdoor Recreation Resources Review Commission 1962b; U. S. Senate Select Committee on National Water Resources 1960; Wildland Research Center 1962; Zivnuska and Shideler 1957). None of these efforts can be considered entirely satisfactory for two main reasons, both of which also present difficulties in the Quetico-Superior Area.

Past use records are short and inaccurate. Quetico Park figures began in 1951, and the figures based on compulsory travel permits go back only to 1955. Statistics for the Boundary Waters Canoe Area (and its predecessors under various names) began in 1946, but until 1960 estimates were based mainly upon reported numbers of customers for outfitters and resorts. As a result the totals may be considerably in error, and changes from year to year are sometimes erratic because of different people making the estimates. Estimates of man-days fluctuated even more than estimates

of visits, because of an almost complete lack of data on length of stay.

Linear projections of these inadequate past histories are questionable. An alternative would involve using the relationships between participation in various sorts of outdoor recreation and other characteristics of society. This approach has promise since data and projections are more readily available for many of the presumably significant variables. Several studies have broken this ground recently.

The first social variables considered in recreation projections were population, income, leisure time, and mobility. Indices of projected changes in these factors were combined by multiplication in the earlier studies (U. S. Forest Service 1959, pp. 23-36; Clawson 1959a, b). In 20th Century America it seems certain that income, leisure, mobility, and population are interdependent, however, and some of these variables may be largely redundant. In fact, the Wildland Research Center (1962, pp. 225-243) used per-capita income alone, and Zivnuska and Shideler (1957) used only population. It also seems unlikely that the variables are simply multiplicative; furthermore, other factors also play a role. Education and tastes are two possible additional variables; again, these are probably interdependent. Another element is undoubtedly supply; this helps to explain the slower increase in State Park use than National Forest use as well as the decline in duck hunters. The Outdoor Recreation Resources Review Commission (1962b, esp. pp. 11-22) used seven factors: family income, education, occupation, place of residence, age-sex, leisure, and an opportunity or supply factor (actually two alternative assumptions about supply). Assumptions about the amount and accessibility of supply are awkward to use in projections made to guide policy decisions about how much outdoor recreation to supply, because of the inevitable circularity.

Given this array of difficulties, what do we know that will help us project trends in the use of the Boundary Waters Canoe Area?

Total Visits

The increase in estimated use of the Boundary Waters Canoe Area has been substantial and quite steady (Fig. 12). The occasional periods of leveling off may partly reflect concern that previous estimates were exaggerated; the one exception is the period of dissension at the time of the air ban in 1949. The average rate of increase per year[13] from 1946 through

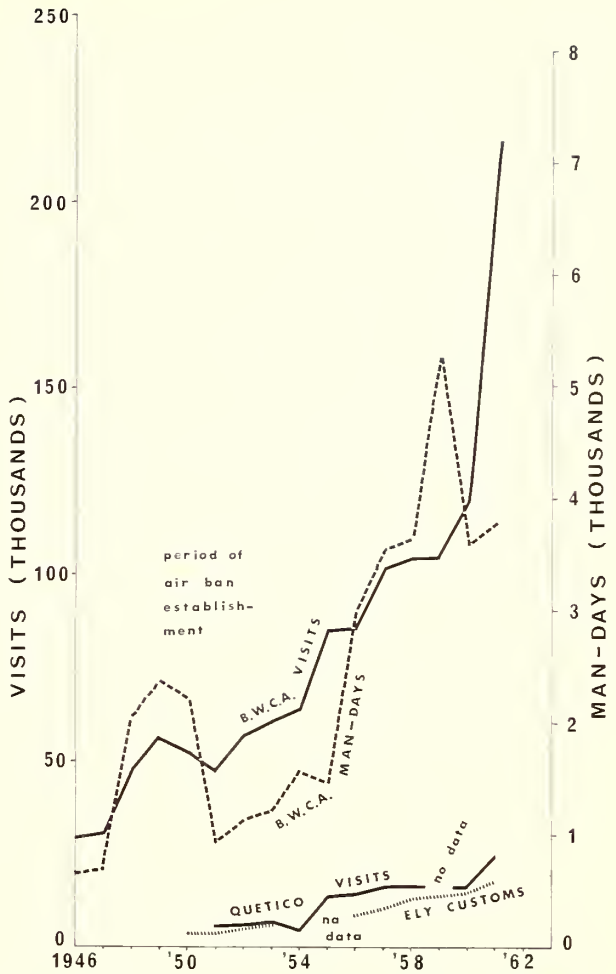


FIGURE 12. — Estimated increase in use of the Boundary Waters Canoe Area and Quetico Park, and U. S. Customs entries at Ely.

1960 was 12 percent. This equals the rate for total recreational visits to all National Forests. The data for 1961 and 1962 show a much more rapid growth, but part of this is due to more accurate estimates based on methods used in this study.

The Forest Service has developed projections of total visits for the Boundary Waters Canoe Area, using the system described above. According to these unpublished figures, by 1976 visits would rise to 319,000, an increase of 207 percent over 1959. By 2000 there would be 785,000 visits in search of solitude, 655 percent more than in 1959. These projections were made before the estimated number of visits was doubled in accord with the survey findings. To fulfill these projections, which may seem high at first glance, the average annual increase in visits would only need to be half what it has been over the last 15 years, figuring from the 1959 base of 104,000 visits.

[13] *Computed by adding the annual percentage increases and dividing the sum by the number of years in the series.*

The Wildland Research Center (1962, p. 236) predicted a 239-percent increase from 1959 to 1976 in man-days spent in the Canoe Area, and a 706-percent rise by 2000. The estimates, both by the Forest Service and by the Wildland Research Center, suggest much faster growth in use of the Boundary Waters than for outdoor recreation in general. All outdoor recreation activities were predicted to increase 58 percent from 1960 to 1976 and 184 percent by 2000 (Outdoor Recreation Resources Rev. Comn. 1962b, p. 22). General camping and boating (other than canoeing and sailing) were predicted to increase only about a third as fast as use of the Boundary Waters Canoe Area.

Quetico Park has had a large increase as well, almost doubling from 1955 to 1961—an average of 13 percent a year during this period (Fig. 12). The figures for 1951-1955 are from voluntary travel permits and are not reliable or comparable with the compulsory permits used after 1955.

Use by Types of Recreationists

The various types of recreationists appear to be distinct and independent. Few individuals shift from one sort of recreation to another except the motor canoeists, a majority of whom have had experience paddling a canoe. This finding (lack of shifting) should be tested in other regions. It contradicts the common local idea that most people progress from resort to campground to canoe trip, "building up courage."

In the long interviews, groups were asked about the nature and amount of their previous experience in the area. If one person in the group had switched types, this was counted so that stability of type of recreation for individuals was still greater than that reported for groups.

The data show several interesting features (Table 11). Paddling canoeists and resort guests were both very definite in their choices, and private cabin users were almost as set in their ways. Motorized canoeists, who were local people more often than were paddlers, were very faithful canoeists; no one in the sample had ever done anything but canoe, although they did switch from paddles to motors. Auto campers and boat campers both had a fair amount of previous experience along many other lines, with two exceptions: neither had used private cabins to any extent, and neither group had done much of the other type of camping. In past research these two camping groups have been combined (Taves and others 1960), but they are distinct. Neither sort of camping is done often by noncamping groups. No canoeists had ever gone boat camping, and few had used auto camps. The hostility of many resort operators to free public campgrounds also seems to have a rather limited basis in this area. Resort guests had almost never camped; and only 22 percent of the auto camper groups had ever used resorts in the area and about half of those had stayed at resorts only once.

Young people's camps have had a strong effect upon the formation of tastes. Of the total sample of 292 groups, 38 had some members who said they came to the area originally as campers at one of the organ-

TABLE 11. — *Amount and type of previous experience in the Quetico-Superior area, for groups*[1]

Type of recreation group	No. of groups sampled	Percent of groups with previous experience in area	Percent of groups with previous experience by type of previous experience						
			Paddle canoe	Motor canoe	Resort	Private cabin	Auto camp	Boat camp	Young people's camps[2]
Paddling canoeists	64	73	91	4	15	2	9	0	52
Motor canoeists	21	71	73	60	0	0	0	0	14
Resort guests	57	84	2	0	94	2	6	2	17
Private cabin users	21	100	14	10	19	81	10	14	10
Auto campers	96	78	22	14	22	5	75	9	7
Boat campers	24	96	22	26	26	0	0	87	0
Day users	9	78	17	50	0	0	0	33	0

1/ A group was considered as having previous experience in the area if even one member had visited the area previously. Data are from long interviews. Data on each line do not add to 100 percent because some groups had had previous experience in two or more categories.

2/ Parties with members who came to the area originally through one of the young people's camps, such as Boy Scouts, YMCA, or private camps.

ization or private camps, and two thirds of these groups were paddling canoeists. Every youth camp in the area builds its program around this type of canoe trip and vigorously inculcates a set of values rating paddling very highly. Since many of these former campers are aging, have married women uninterested in canoe trips, accumulated children, and acquired friends without their own biases, the two-thirds figure seems very high.

Trends in use for each of these types are very poorly understood. Official statistics are not yet detailed enough to be broken down by types of recreationists. Very generally, it appears that canoeing, boat camping, and auto camping have all been increasing rapidly since the air ban in 1949-52. This is the general opinion of local Forest Service personnel and tourist businessmen. It also corresponds to conclusions based on changes in the numbers of canoe outfitters compared to resorts. Most of the outfitters have prospered and grown and have fleets of canoes stacked like cordwood. As another indication, accurate counts kept by the operator of the railroad portage into Lac La Croix since 1957 show that canoes increased 83 percent in 4 years.

The rapid growth of young people's camps means still more canoeing. The largest camp is the Region 10 Boy Scout Canoe Base on Moose Lake. In 1948 less than 500 Scouts used the base; in 1961 2,340 poured through—almost five times as many. The other camps have also grown substantially. About half of the present youth camps started after 1948. In addition many camps elsewhere in Minnesota and Wisconsin now send some groups to the area for canoe trips.

The earliest known estimate of numbers of canoeists refers to 1940—2,000 people (Chapman 1945, p. 98). In 21 years the number grew to about 35,000 canoe trippers (during the entire year), with over 6,000 others canoeing without taking a trip.

In 1948 the Forest Service, in connection with the air ban, estimated users as follows:[14]

15,660	by canoe
11,000	by seaplane
21,610	by motorboat
48,270	Total

From this it is also clear that canoeing has increased more than boating—nearly three times—while boating has about doubled.

There is no such index of boat camping because boat campers are self-contained and bypass resorts and the like. General observation at access points suggests a rapid increase. The operator of the Lac La Croix railroad portage started counting boat campers in 1958. They increased 64 percent in the next 3 years. It is also indicative that boat trailer sales in 1956 were 40 times greater than in 1947 (Clawson 1958, p. 61).

On the other hand, no new resorts have been built within the study area since 1950; and since 1946, 33 inside the Boundary Waters Canoe Area have been purchased and removed by the Forest Service. The remaining resorts have expanded about 15 to 25 percent, according to local estimates, but probably not enough to offset the decrease in capacity. The resort business appears only fair—two resorts were closed during 1960, and one was bought by a young people's camp and converted. Business may still be better, however, than in comparable areas in Minnesota because of the wilderness attraction.

Again, the Lac La Croix railroad portage data are useful: From 1959 to 1961 resort traffic increased only 3 percent.

Private cabins have increased perhaps 25 to 50 percent since 1950, despite the purchase and removal of 73 cabins inside the Boundary Waters Canoe Area by the Forest Service.

Auto campground use has also grown, probably faster than capacity has been added. This is the only category for which trends (but not totals) can be extracted from the official estimates. From 1946 to 1960 there was about a 480-percent increase or about 14 percent a year. This is higher than the 12-percent rate of total Boundary Waters Canoe Area visits, but may be slightly lower than for canoeing and boat camping.

Some of the estimates based on the preliminary field work in 1960 can be compared very cautiously with the 1961 data—cautiously because the 1960 data were not fully satisfactory and because an adjustment for different survey periods is necessary. The figures on canoe use and boat camping are most reliable. Estimated canoe use increased 40 percent,[15] and boat camping 46 percent. In contrast, business records indicate resort use increased only 4 percent from 1960 to 1961.

In summary, the past decade has shown very rapid growth in canoeing and boat camping, rapid increase in auto camping, moderate growth in private cabin

[14] *From the files of the Superior National Forest, Duluth, Minn., as Exhibit "D" sent to I. H. Polk, Secretary, Air Space Subcommittee of the Air Coordinating Committee, Civil Aeronautics Administration, March 23, 1949.*

[15] *This figure corresponds exactly to an estimate made by the Ely Chamber of Commerce and reported in the Minneapolis Tribune, Oct. 21, 1961.*

use, and slow expansion of resort use. The dispersed uses, which require little or no construction of facilities, grew fastest, while the uses requiring substantial capital investment lagged. Auto campgrounds, which require an intermediate amount of building, grew at an intermediate rate. This relation to supply elasticity is to be expected in the short run, but 10 years is a rather long short run. The resort response apparently reflects market problems more than a time lag in construction.

These fragmentary records are not sufficient for mathematical projections of types of use. There is no reason, however, to expect the recent relative growth rates to change greatly. The management policies appear to be stable into the foreseeable future. The elimination of the remaining internal resorts and cabins will probably be complete soon, but the present use of these facilities is not large. New access roads around Quetico Park should accentuate the growth of canoeing and especially boat camping, as seems to have happened at French Lake. Facilities probably will continue to grow adequately for these projected demands. The Forest Service is increasing campground capacity substantially under the Public Works Acceleration Program, and there is the possibility of a further step-up of campground construction if the 10-year program proposed by the Forest Service is carried out. This program provides for over a sixfold increase in National Forest campground numbers and capacity. Whether this would saturate demand and reduce crowding or stimulate a surge of visits is not known.

Looking further into the future is still more difficult, but some of the characteristics of the various sorts of users lead to some interesting speculation when related to the ways society seems to be changing. Table 12 presents a socio-economic description of the visitors.

Occupation trends for males have been computed for the period from 1950 to 1959. Changes in the number of individuals in each class were:

Occupational Class	*Percent Change*[1]
Professional, Technical	+ 52
Farmers, Farm Managers	— 28
Proprietor, Manager, Official	+ 34
Clerical, Sales	+ 9
Skilled Labor, Foreman	+ 9
Other Labor	+ 5
Retired[2]	+ 40

[1]Sources of data are: Tables 278 and 347, Statistical Abstract, 1959; table 287, Statistical Abstract, 1954. Same approximation for retired persons as was used in table 12 (footnote 3, Category II).

[2]Data years for retired persons are 1951 and 1958; hence the difference in percent is for 7 years instead of 9.

A continuation of these trends, assuming that the rates of participation in different sorts of recreation for each occupational category do not change, would lead to paddling canoeists increasing most rapidly. About three-fourths of the paddlers (excluding students) were professional-technical people, the most dynamic occupational category. If the 1950-1959 percent change for each occupation category is multiplied by the percent of the recreation class belonging to that occupation, and the values for each type of recreation are totaled, the results are:

Paddling canoeists	142
Motor canoeists	129
Resort guests	129
Auto campers	124
Private cabins	123
Boat campers	113
Day users	110

These are only index figures showing the relative impact of recent occupation trends. They are not projections of percent change for any target year.

Changes in the number of families and unattached individuals in various income classes, 1950 to 1958, were:

Income Class	*Percent Change*[1]	
$ 0– 1,999	— 30	
2,000– 3,999	— 27	
4,000– 5,999	+ 8	
5,000– 7,499	+ 94	+ 119
7,500– 9,999	+ 153	
10,000–14,999	+ 216	
15,000–24,999	+ 198	
25,000–49,999	+ 100	
50,000 and over	+ 68	

[1]Sources of data: Statistical Abstract, 1959, table 409, and Survey of Current Business, July 1961, table 18.

These are incomes for families and are, therefore, higher than the head-of-household figures in Table 12 for any families with more than one member receiving income. The following indices of relative growth are obtained from the projected changes for each income class. (The same method and limitations mentioned in connection with occupation indices apply here.) The very well-to-do resort guests head the list:

Resort guests	160
Private cabins	144
Paddling canoeists	139
Motor canoeists	137
Auto campers	131
Boat campers	117
Day use	95

The Census Bureau has projected educational attainments to 1980:

TABLE 12. — *Selected social characteristics of visitors[1] to the study area 1960-61*

Category	Canoeists		Campers		Resort guests	Private cabin	Day use[2]	National[3]
	Motor	Paddle	Auto	Boat				
I. INDIVIDUALS								
Number	87	350	424	83	218	92	47	-
Males (Percent)	87	82	54	69	60	62	60	49
Females (Percent)	13	18	46	31	40	38	40	51
Age (Percent of total):								
1-12 years	3	5	29	12	17	17	27	27
13-19 "	40	59	16	11	6	21	11	11
20-34 "	36	20	14	20	13	22	26	19
35-54 "	12	14	37	46	42	17	27	25
55 and over	9	2	4	11	22	23	9	18
II. OCCUPATION (CENSUS BUREAU DEFINITIONS) PERCENT OF TOTAL MALES OVER 17 NOT IN SCHOOL								
Professional, technical	26	71	26	15	27	27	6	9
Farmer, farm manager	5	1	4	2	3	4	0	6
Proprietor, manager, official	32	13	17	2	30	4	0	12
Clerk, sales	0	7	7	11	9	12	6	12
Skilled labor, foreman	13	2	21	39	13	23	31	17
Other labor ("operatives," service workers, laborers)	19	6	22	22	9	18	57	34
Retired	5	0	3	9	9	12	0	10
III. STUDENTS--AS A PERCENT OF TOTAL								
Percent	46	69	40	20	19	34	23	25
IV. ANNUAL INCOME OF HEAD OF HOUSEHOLD (BEFORE TAXES)--PERCENT OF TOTAL[4]								
$ 0 - 1,999	0	0	0	2	1	0	0	15
2,000 - 3,999	12	12	8	2	4	12	6	22
4,000 - 5,999	30	21	34	55	15	16	44	23
6,000 - 7,999	19	28	33	22	20	32	38)	27
8,000 - 9,999	11	9	9	10	8	6	6)	
10,000 - 14,999	19	16	12	7	30	17	0	9
15,000 - 24,999	3	9	4	2	13	11	6	3
25,000 - 49,999	6	5	0	0	8	6	0	1
50,000 and over	0	0	0	0	1	0	0	0.3
V. EDUCATIONAL LEVEL OF THOSE WHO HAD COMPLETED SCHOOL--PERCENT OF TOTAL								
0 - 8 years	13	0	12	9	10	11	20	50
9 - 11 "	13	4	10	28	8	17	7	15
12 - "	23	17	43	38	37	23	63	22
13 - 15 "	15	12	15	9	13	17	10	8
16 - "	25	42	14	13	24	19	0)	5
17 and over	11	25	6	3	8	13	0)	

1/ Visitor data from long interviews.

2/ Day use does not include auto sightseers.

3/ The national figures presented here were obtained from the following sources:

Category I. (no. of individuals): U. S. Census of Population: 1960, General Population Characteristics, United States Summary. Table 46, pp. 148-149.

Category II. (occupation): From Statistical Abstract of the United States, 1959. Table No. 278, Major Occupation Group and Class of Worker of Employed Persons, Males, 1959; and table No. 347, Selected Characteristics of the Civilian Population 65 Years Old and Over, Males Not in Labor Force, 1958 (as an approximation of retired males). The figures given are the percent of the total of these two groups.

Category III. (students): Statistical Abstract, 1959, tables 2 and 128. Figures refer to 1958.

Category IV. (annual income): Consumer units and family personal income, before income taxes, 1958, from Survey of Current Business, July 1961, table 18. These figures are not the same as head of household income, due to supplementary income from wives, etc. Although the general shape of the distribution is similar, it is moved upward relative to study data.

Category V. (educational level): From Statistical Abstract, 1959, table No. 141. Data for West North Central area only; years of school completed by persons 25 years old and over, 1950, for Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

4/ Groups consisting entirely of students are excluded.

Years of School Completed	*Percent Change*[1] *1960-80*
0– 8	—31
9–11	+40
12	+90
13–15	+69
16 or more	+91

[1]Source of data: Statistical Abstract, 1959, table 142, Series A (short-term) trends.

If recreational visits within each educational category were to change at these rates, the changes in national educational levels would produce the greatest increase among paddling canoeists, who usually were very well educated. The index numbers, using the same multiplying procedure previously described, would be:

Paddling canoeists	188
Resort guests	171
Motor canoeists	167
Auto campers	167
Private cabins	165
Boat campers	163
Day use	161

Whether there is a causal connection between these social characteristics and the choice of recreation has not been proved, but it seems reasonable that education and occupation, which are strongly related, would have a great deal to do with shaping tastes.

Income, also related to education and occupation, is probably less a causal factor and more a reflection of the type of work and the amount of schooling. This conclusion seems to follow from the fact that price differences between the various classes of Quetico-Superior recreation are rather small. Complete canoe outfitting costs about $6 per person per day compared to daily rates of $10 to $12 per person at American plan resorts. Camping involves less direct outlay after the basic equipment has been acquired. Two weeks' camping each year might cost only $15 per week (plus the cost of food) if the life of the equipment is assumed to average 10 years. This could be compared to $40 to $60 per week for a housekeeping cabin. Boat camping is more expensive, because of the additional boat expense. All of these classes—even resort guests—enjoy many free recreation goods and services because of the public provision of lakes, scenery, fish, portage trails, and the like, thereby reducing the role of price in choosing recreation. Also, although income probably changes more for individuals over time than does education level or major occupational class, data previously presented indicated that individual recreational preferences are quite persistent. Income seems to be more *necessary* than *sufficient* as an explanation of recreation choices. Money does not form tastes, it limits their expression, but few people would be priced out of the market here for any type of recreation, with the possible exception of the American plan resorts and private cabins.

Population trends also suggest only small differences in the relative rates of increase for each type of recreation. Population change, 1959 to 1976, has been projected as follows:

Area	*Percent Change*[1]
Minnesota	27
Dakota	20
Iowa	17
Illinois	22
Wisconsin	25
Michigan, Ohio, Indiana	35
Missouri, Kansas, Nebraska	24
Northeast[2]	28
South[2]	27
West[2]	45
Total U. S.	30

[1]Source of data: National Forest Recreation Survey, supplementary data contained in memorandum from Washington Office dated Aug. 5, 1960, in files of the Lake States Forest Experiment Station, St. Paul, Minn.

[2]Defined in notes on table 6, p. 20.

Regions within Minnesota were treated individually because Minnesota accounts for a large proportion of all visitors, but population growth rates vary greatly within Minnesota. The resulting index numbers for the increase in total visits due to population growth are:

Resort guests	131
Private cabins	131
Paddling canoeists	129
Auto campers	128
Motor canoeists	127
Boat campers	125
Day use	121

The construction of the Interstate Highway System, which will reach Duluth, would be expected to contribute most to the relative accessibility of more distant areas; these are the most important as source areas for paddling canoeists and resort guests, and least important for day users and campers. The meaning of travel time to location choices, however, is not well understood. Travel time may be effective in zones, rather than continuously, and improved highways might bring the Canoe Country into the weekend camping zone.

Summary of Projections by Types of Use

The trends suggested by these four factors—occupation, income, education, and residence—agree quite

well. Day use was the least dynamic in every case. That boat camping was next lowest on all four is interesting because this type of visitor seems to have increased very rapidly in the past. The implications are that technology (light metal boats, improved motors, and better boat trailers) opened new possibilities which were quickly exploited, but that the sorts of people with preferences for boat camping in this area are not a rapidly expanding portion of the population and consequently this activity may level off. Sales of boats, outboard motors, and boat trailers all reached peaks between 1956 and 1960 and have dropped substantially since then (Nat. Assoc. of Engine and Boat Mfrs. and Outboard Indus. Assoc. 1962).

The canoeists who paddle seem to be the most dynamic social group; they lead in growth rates on the basis of occupational and educational changes, and they are third on the basis of population shifts in areas of residence (the factor for which differences were smallest). Only for income shifts do canoeists move very far down in the rank order of growth indices — below resort guests and users of private cabins—but income is probably a less critical variable.

The resort category also seems to have great expansion possibilities; it is first or second on every measure. Private cabin use, auto camping, and motor canoeing seem intermediate, with cabin use perhaps a little higher.

All of these conclusions rest upon three assumptions: First, that for any given class of people, preferences and their expression will retain the same relationship to the four variables over time; second, that these are the major variables; and third, that for the first three measures, national trends represent the visitor source areas. Certainly none of the assumptions is completely met, but they may be near enough to the truth to produce useful expectations. A literature search indicates that no studies of the formation or change of outdoor recreation tastes have been made, so there is no basis for refining the first two assumptions.

Use by Areas

The survey data cannot provide a base for estimating trends in the distribution of use; but some very general conclusions could be drawn from the past trends for types of use. Reasoning this way, one would suspect that Moose Lake and Crane Lake have increased at an above-average rate because canoeing, in which Moose Lake leads, and boat camping, concentrated at Crane Lake, have been particularly fast growing. The difference between fringe use and interior use may also have decreased because the uses with more gradual gradients (canoeing) seem to have been growing faster than the predominantly marginal uses (boating). These general areal trends probably will continue into the future.

Data for visitors entering Quetico Park at each of its official access points (Table 13—see Plate I for locations) show that Lac La Croix, where most of the visitors are motorboaters, had the most rapid increase between 1958 and 1961. But the figures are of doubtful comparability. In 1961 an American resort and seaplane operator at Crane Lake was authorized to issue Quetico Park travel permits for the Lac La Croix area to his customers. These people accounted for most of the increase, and it is likely that some of them previously entered the part of the lake in Quetico Park unofficially. Beaverhouse Lake also had a rapid increase from a small base. This point, primarily used by Crane Lake seaplanes, was unlike any other entry point. French Lake expanded very rapidly after the road was opened in 1957. The largest increase in number of visitors was at Basswood Lake, which had two entry points, but the rate was lower. Over half of all entries were made on Basswood. Saganaga Lake was the only entry point where a large comparable lake area existed in Canada outside the Park, which may have led to some people choosing not to enter the Park, and contributed to the low increase. Some outfitters in the Saganaga area also kept a number of canoes without the $5 stickers and recommended trips outside Quetico.

These 3-year Quetico trends, if continued, would have the effect of spreading use more evenly, but the basis for establishing the trends is very short.

TABLE 13. — *Quetico Park visitors by access points, 1958, 1960, and 1961, and percent of change*[1]

Access point	1958	1960	1961	Change 1958-61
	Number	Number	Number	Percent
Lac La Croix	1,435	2,082	3,277	128
Beaverhouse Lake	514	813	1,018	98
French Lake	2,894	3,737	5,632	95
Basswood Lake[2]	9,895	9,030	13,244	34
Saganaga Lake	1,571	1,276	2,019	29
Total	16,309	16,938	25,190	54

1/ Data are from official records. Figures for 1959 and years before 1958 were unavailable.

2/ An international Scout meeting in Colorado in 1960 resulted in fewer visitors to the Boy Scouts canoe base and largely accounts for the smaller Basswood Lake figure for that year.

SUMMARY AND CONCLUSION

The Quetico-Superior Area is a large region, partly preserved and partly restored to provide a primitive setting for recreation, especially canoeing, with logging limited but not prohibited. It is a semi-wilderness. This is a type of area which was called for by Robert Marshall, the founder of the Wilderness Society and one of the people most responsible for the National Forest Wilderness Areas (Marshall, 1933, pp. 473-476). This call for semi-wilderness as part of a full range of types was repeated by the Outdoor Recreation Resources Review Commission (1962a, p. 71) and by A. H. Carhart (1961). The Boundary Waters Canoe Area is the only official semi-wilderness area in the United States and, therefore, it is of particular interest.

The location and physical geography of the area led to late and limited settlement and economic development of the Quetico-Superior, and made possible the public policy of maintenance and restoration of primitive waterways. The same two factors have led to use predominantly by Midwesterners, for whom it is the closest wild land and almost the only canoe country.

Amount of use. — Use was substantial. About 132,000 people visited the study area during the main summer season of 1961, and over 72,000 used the Boundary Waters Canoe Area. Apparently the study area may account for half of the overnight recreational use of the three northeastern Minnesota counties of St. Louis, Lake, and Cook, despite the large area in the three counties outside the study area and the competing attraction of the Lake Superior North Shore highway. The Boundary Waters Canoe Area alone may account for one third of all overnight man-days in the tri-county area. Both of these conclusions are based upon estimates of visitors other than campers for 1958 (Sielaff, 1959) plus an estimate of State Park and National Forest campers.

Types of use. — Canoe tripping was the largest of the seven types of use (32,000 people), but for the entire study area more people boated than canoed (five of the other user types were mainly boaters). Even within the Boundary Waters Canoe Area there were almost as many boaters as canoeists. Auto sightseers were second, followed by resort guests, auto campers, boat campers, one-day visitors, and private cabin users.

Distribution of use. — Maps of every type of use tell the same story; a few places had most of the visitors, and most places had very few. One tenth of the access points had over half of every type of use. This very uneven distribution does not seem optimal if solitude is a goal. Furthermore, the canoeists, who most desired solitude,[16] were the most concentrated in terms of access point use. Over half of the paddling canoeists used the Moose Lake access.

The patterns of concentration differed from type to type. Considering access point use first, canoeists formed one class, auto campers a second, day users a third, and all other boaters a fourth. For all types except day use, large border lakes were much more heavily used than southern areas, and for canoeists especially, places close to Quetico Park had the heaviest use.

Away from access points, boating and canoeing differed sharply. Only about one fifth of the boaters went over unmechanized portages, but many used mechanized portages; as a result two large lobes extended along the border from an otherwise marginal use distribution. Boaters were vague as to reasons for choosing their route. Canoeists went much farther, especially paddlers, and almost all of the area was visited—much of it by only a few parties, however. Canoeists were more definite concerning the basis for their choice of route, but outfitters' advice was the leading reason. The Canadian border did not act as a significant barrier for either boaters or canoeists.

Trends in use. — Total use of the Boundary Waters Canoe Area has been increasing at about the same 12-percent rate as all National Forest recreation visits. Use of Quetico Park has been increasing slightly faster. Canoeing seems likely to increase the most in the future.

The Prospect. — The large, lightly used areas are mainly in the southern Boundary Waters Canoe Area, and to a lesser extent in western Quetico Park. These areas seem attractive. Are they a potential for the expected increase in future use? The answer to this question depends upon the identification of the carrying capacity of a wilderness-type recreational area. This is a difficult problem, but a tentative system has been developed and it will be presented in a subsequent paper which will build upon this one.

[16] *Data on this point will be contained in a later paper.*

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The study area, centered on the Superior National Forest's Boundary Waters Canoe Area and Ontario's Quetico Provincial Park, had over 130,000 visitors in 1961. Canoeists were the most numerous, but barely. Use was very unevenly distributed geographically. Canoeist use of access points was most strongly associated with locational characteristics, auto camping the least associated. Distant access points were used as much as closer ones. Beyond access points, many boaters were vague about reasons for choice of routes, unlike canoeists. Since 1945, canoeing has increased above the average annual 12-percent rate for total use, and this is likely to continue.

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